



Voltaire Switch User Manual
ISR 9024, ISR 9096, and ISR 9288 Switches

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Business Headquarters

Voltaire Inc.
6 Fortune Drive, Suite 301
Billerica, MA USA 01821
Tel: 978-439-5400
Fax: 978-439-5401

Israel Office

Voltaire Ltd.
9 Hamenofim St.
Bldg. A Herzeliya
46725, Israel
Tel: +972 (9) 971-7666
Fax: +972 (9) 971-7660

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This preface describes the audience, organization and command syntax conventions of the *Voltaire Switch User Manual*. It also provides information on how to obtain related documentation and technical assistance. Information about hardware installation of Voltaire switches can be found in *ISR 9024 Installation Manual* and in the *ISR 9XXX Installation Manual*, which includes the ISR 9096 and the ISR 9288.



NOTE

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Audience

This manual is primarily intended for system administrators who are familiar with the fundamentals of router-based internetworking and network storage devices, but who might not be familiar with the specifics of Voltaire products or the routing protocols supported by Voltaire products

It is assumed that readers are familiar with InfiniBand technology and terminology.

Document Conventions



NOTE

Text set off in this manner presents clarifying information, specific instructions, commentary, sidelights, or interesting points of information.



IMPORTANT

Text set off in this manner indicates important information regarding a specific feature.



CAUTION

Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

Document Organization

This guide contains the following chapters:

- *Chapter 1. – Introduction:* Describes the InfiniBand technology and provides an introduction to the ISR 9024, ISR 9096 and ISR 9288 switches.
- *Chapter 2. – Voltaire Command Line Interface (CLI):* Introduces the Voltaire Command Line Interface (CLI).
- *Chapter 3. – Voltaire Fabric Manager:* Describes the Voltaire Fabric Manager (VFM), a Graphic User Interface (GUI) application that provides a wide range of provisioning, configuration and maintenance functions for the Switch, and provides operation instructions.
- *Chapter 4. – Voltaire Device Manager (VDM):* Describes the Voltaire Device Manager, a Graphic User Interface (GUI) application for device management and switch configuration and provides operation instructions.
- *Chapter 5. – Partitioning:* Describes the Partitioning feature used to enforce isolation among systems using an InfiniBand Fabric and provides instructions on how to assign partition keys (Pkeys). It also describes how Partitioning is used to associate hosts or devices that share common attributes.
- *Chapter 6. – Fabric Diagnostic :* Provides information on logging and monitoring functions for advanced fabric debugging and failure detection capabilities.
- *Appendix A – CLI Commands Reference:* Details the CLI command menus. The CLI provides configuration and management functions for Voltaire switches, as well as a wide range of provisioning, configuration and maintenance functions for the InfiniBand fabric.
- *Appendix B – Port Counters :* For Advanced Diagnostics - Describes and details the port counter fields of the CSV file, details the CSV counters summary reports and lists the ports counters currently available.
- *Appendix C – Supported Traps and Events:* Describes the Event Notification Mechanism, defines the structure of traps and lists the traps, events and alarms supported in this version.
- *Appendix D – Glossary*
- *Appendix D – Index*

What's New in this Manual?

This switch software version includes the following new features:

- **The Voltaire 96 port chassis (ISR 9096)** was added to the manual.
- **IPoIB and In-band Management. Management Boards (sMBs)** Hosts use InfiniBand instead of Ethernet to run the Device Manager, on page 1-11
- **ISR 9096/9288 External Ports.** The ISR 99096/9288 external ports are configured to work in 12X/4X auto detection mode, meaning, they are capable of working in 12X mode in case they are cabled to another 12X enabled port, on page 1-10.
- **Full Hot Swap Support.** Hot swap support was added for sMB modules and for Fabric Board (sFB) modules, on page 1-13.
- **Chassis Management with I/O Modules.** Users can fully configure and monitor I/O modules embedded within the switch management, via the GUI and CLI, on page 2-10.
- **Redundant sMB Configuration.** The ISR 9096/9288 supports redundant sMB configurations. One sMB serves as the active chassis manager while the other is a standby management board. The latter takes control when it detects a failure of the active sMB. The redundancy mechanism maintains consistent replications of the system configuration parameters on both sMB modules, on page 2-19.
- **Single Software Image for Both Platforms (ISR 9288/9096).** The same software image can be used to manage either an ISR 9096 system or ISR 9288 system. The software automatically detects the system type and executes the suitable device management operations, on page 2-19.
- **Enhanced VFM,** on page 3-1.
 - **Table view.** Users can find out the status of each node through color-coded displays based on current alarm information.
 - **System Grouping.** ISR 9096/9288 systems are automatically detected, grouped as a single entity, and represented as a single icon in the fabric topology map, hiding its internal structure and simplifying the map. Note: grouping is not supported in this version for the sLB-8-12. On page 3-42.
- **Enhanced Device Management,** on page 44-1
 - Device Zoom View support, Fan rate indication (Normal mode or Turbo mode), and MediaConverters Graphic display (to differentiate between IB media connected to a port)

- **VPD data of each module.** Users can view the VPD (Vital Product Data) serial number and hardware versions of each board in a read-only field, as described in the Obtaining Detailed Module Information Section, on page 4.5.6.
- **Subnet Manager Enhancements.** Support for: partitioning, configuration of subnet parameters, automatic join mode (disabled by default), on page 5-1.
- **Enhanced Fabric Diagnostic,** on page 6-1.
 - **Enhanced VFM GUI for Fabric Diagnostic.** Sorting to current alarm table (in alarm data), filtering in current alarm dialog box, peer information to current alarm, enhanced switch list and host list, enhanced Router Blade Drawers (sRBD) tree pane.
 - **Enhanced Fabric Summary Tool.** This tool indicates the specific platform to which a port belongs and identifies the peer on the other end of the port's link. This information enables faster location of the troubled link and faster stabilization of the IB fabric.
 - **Enhanced Event Notification.** Includes port counter threshold exceed event indication, right-click options, and an event indicating links that are operating with a link width of 1X.
- **Enhanced CLI,** on page A-1.
 - The user has access to diagnostic utilities by the means of the CLI, View Mode for Log Files, Chassis Firmware Scan.
 - Enhancement of Secure CLI Access with SSH support (Secure Shell), on pages 1-11 and 2-13.



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Chapter 1. Introduction

In this Chapter

This chapter provides a brief introduction to InfiniBand technology and describes Voltaire ISR 9024, ISR 9096 and ISR 9288 switches.

The following information is included in these pages:

- About InfiniBand, on page 1-1
- InfiniBand System Elements, on page 1-3
- ISR 9024 System Overview, on page 1-4
- ISR 9096/9288 System Overview, on page 1-5
- Voltaire Switch Management Interfaces, on page 1-11

1.1 About InfiniBand

InfiniBand technology is a high-performance channel-based interconnect architecture that provides increased scalability and reliability for servers and other Internet infrastructure equipment. InfiniBand architecture defines the entire stack, from the physical to the application layers APIs and fabric management.

InfiniBand has unique capabilities for direct data placement implemented by RDMA and for OS bypassing, discovery, fail-over, remote boot, I/O sharing, and other advanced features.

InfiniBand is the IT industry's solution for expanding data network centers to prepare for the next generation of communications. e-business, Internet use and the demands of the communications age have created the need for increased processing power, larger stores of information and a greater, more reliable flow of data. As the present architecture struggled under the current load of information, it was painfully clear that a solution was needed in order to manage the increasing demands of the future. The giants of the IT industry (Compaq, Dell, IBM, Intel, HP, SUN and Microsoft followed by more than 230 companies) combined the best elements of two competing technological initiatives to create InfiniBand, an industry standard that has been adopted with confidence. Solving a great number of obstacles that data centers were facing (scalability, reliability, manageability), InfiniBand enabled the introduction of data clusters, an invaluable next step to data center construction.

In effect, InfiniBand is a fabric-based, switched network that allows devices such as servers, storage and I/O to communicate at very high speeds. Until the advent of InfiniBand, communication devices had to wait in line to send their information through one shared bus. The ten-year-old architecture had reached its limits and did not have enough bandwidth available to meet the rising demands of the information load.

InfiniBand architecture is based upon a very different concept. Offering high-speed interprocessor communication and memory sharing, it enables you to build server clusters with performance comparable to that of large servers at a fraction of the price. Instead of one bus through which every device communicates, InfiniBand architecture offers a network fabric that incorporates numerous switches and router modules, allowing devices to communicate simultaneously. Speed is no longer restricted by the shortcomings of the infrastructure. InfiniBand operates at 2.5Gb/s (1X), 10Gb/s (4X), 20Gb/s (4X DDR), 30Gb/s (12X) to 60 Gb/s (12X DDR).

InfiniBand architecture is modular, highly scalable (it allows for virtually unlimited network expansion) and reduces the workload of the operating system kernel and the CPU, freeing their power to run applications. Offering advanced fault isolation controls, nonexistent in previous protocols, InfiniBand provides a high level of fault tolerance. And most importantly, because the InfiniBand system is modular, processing power based on commodity servers can be added as needed.

1.1.1 InfiniBand System Elements

The following are the InfiniBand system elements:

- **HCA** (Host Channel Adapter), an adapter or silicon chip residing on the host motherboard providing the host side functionality and advanced reliable message passing capabilities.
- **Switch**, connecting all the nodes in a switched point-to-point manner.
- **Router Modules**, providing connectivity to other InfiniBand or IP subnets.
- **Storage** (native and Fibre Channel access)

InfiniBand provides a reliable, low latency interconnect (with typical switch latency of 100nS) with fault-tolerance mechanisms (Automatic Path Migration), physical multiplexing (Virtual Lanes), physical link aggregation (1X, 4X, 12X) and security/partitioning.

The InfiniBand fabric provides central management and configuration controlling discovery, failures and resource allocation.

1.2 ISR 9024 System Overview

The Voltaire ISR 9024 is a high performance, low latency, fully non-blocking switch for high performance computing (HPC) clusters and grids. Offering available bandwidth of 480 Gb/s, the Voltaire ISR 9024 is a cost-effective alternative to proprietary interconnect technologies. With twenty-four 10 Gb/s ports in a 1U chassis, the standards-based ISR 9024 delivers three times the port density of proprietary offerings. Using the Voltaire ISR 9024, you can build high performance clusters and grids that scale from several to hundreds of nodes.

The ISR 9024 serves as a cost-effective building block for Fat Tree topologies of hundred of nodes for scientific, commercial HPC and enterprise grid applications. When combined with the Voltaire ISR 9096/9288 high port density switch, the Voltaire ISR 9024 enables the formation of clusters scaling to thousand of nodes.

The ISR 9024 architecture features a passive cooling device (with no fans) resulting in a noise free, high MTBF unit.

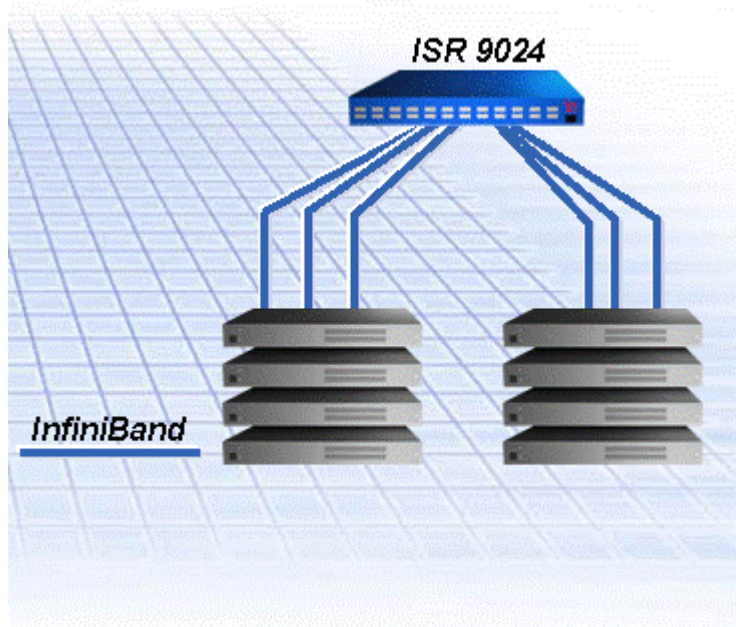


Figure 1-1. Voltaire ISR 9024 Switch Functional Diagram

1.3 ISR 9096/9288 System Overview

The Voltaire ISR 9096/9288 InfiniBand Multiprotocol Switch is a modular platform for building high levels of performance and scalability for large high performance computing (HPC) clusters. The Voltaire ISR 9096/9288 enables high performance applications to run on distributed server, storage and network resources.

Elegantly designed with 10/30 Gb/s of full bisectional bandwidth for up to 96 or 288 4x/12x ports in a single chassis, multiple ISR 9096/9288 can also be interconnected to form very large clusters.

Possible configurations range from dozens to thousands of nodes with many upgrade paths available.

Featuring fat tree (Clos) topology that provides full bisectional bandwidth for each port, the Voltaire ISR 9096 leads the InfiniBand industry with the highest switching capacity.

Providing unmatched levels of InfiniBand bandwidth, the ISR 9096 and the ISR 9288 respectively support up to 96 and 288 InfiniBand ports, which can be used in any combination of 10 Gb/s 4X Ports and or 30 Gb/s InfiniBand 12X ports. The 12X port incorporates three 4X InfiniBand ports aggregated into a single InfiniBand port.

Wire-speed non-blocking switch capacity combined with latency of less than 420 nanoseconds make the Voltaire ISR 9096/9288 the highest performing switch available.

In addition to scalable InfiniBand switching, the Voltaire ISR 9096/9288 offers powerful multi-protocol connectivity in a single, flexible system. In specific configurations, the chassis hosts the Voltaire Router Modules, providing seamless connectivity between server clusters, FC SANs, NAS appliances, IP SANs and TCP/IP networks (LANs).

For further flexibility, InfiniBand 4X (10 Gb/s) and 12X (30Gb/s) ports, InfiniBand-to-TCP/IP Router Modules and InfiniBand-to-Fibre Channel Router Modules can be mixed and matched, upgraded and expanded as necessary, allowing users to configure systems to exact requirements.

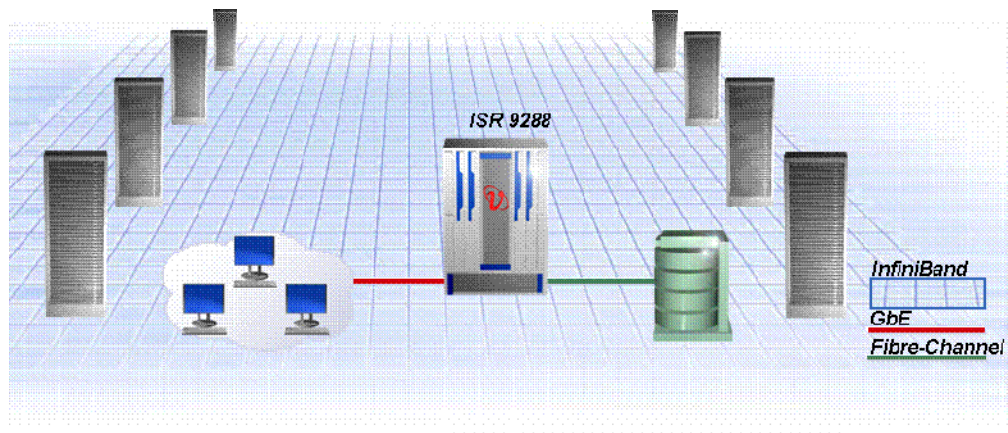


Figure 1-2. Voltaire ISR 9288 Switch Functional Diagram

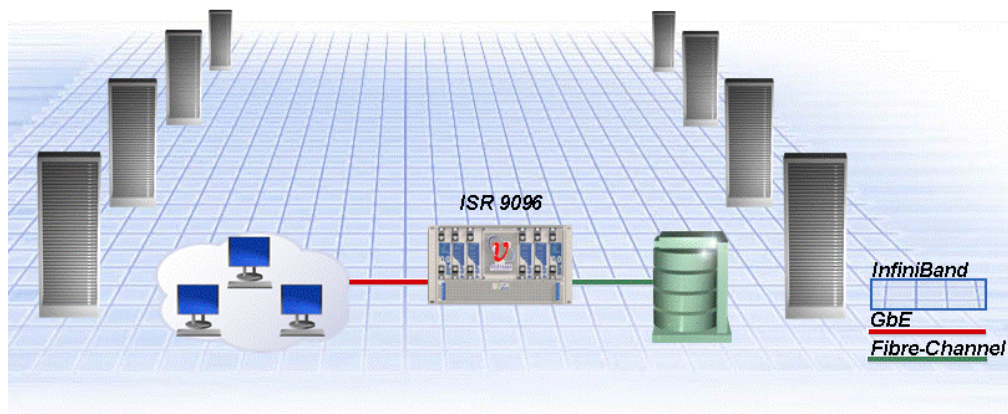


Figure 1-3. Voltaire ISR 9096 Switch Functional Diagram

1.3.1 ISR 9096/9288 Field Replaceable Units (FRUs)

The following are the ISR 9096/9288 Field Replaceable Units (FRUs). All FRUs are hot swappable components:

Fabric Board (sFB)

The ISR 9096/9288 supports up to four redundant hot-swappable Fabric boards, which support the switching Fat Tree topology.

- The ISR 9096 Fabric Board is identified as sFB-4, supporting connectivity of up to 4 sLB/sRBD modules.
- The ISR 9288 Fabric Board is identified as sFB-12, supporting connectivity of up to 12 sLB/sRBD modules.

Line Board (sLB)

Hot-swappable sLB-24 board with 24 4X IB ports and sLB-8-12, with 8 12X IB ports.

- The ISR 9096 can host up to 4 sLB-24 or sLB-8-12 or any combination thereof.
- The ISR 9288 can host up to 12 sLB-24 or sLB-8-12 or any combination thereof.

Management Board (sMB)

One or two redundant hot-swappable Management Boards.

Router Blade Drawer (sRBD)

A mechanical and electrical interface with up to three IPR and/or FCR Router Modules.

- The ISR 9096 enclosure can contain up to 4 hot-swappable sRBDs.
- The ISR 9288 enclosure can contain up to 11 hot-swappable sRBDs.

Power Supplies (sPSU)

- The ISR 9096 supports up to four redundant hot-swappable Power Supplies with N:1 or N:N redundancy.
- The ISR 9288 supports up to five redundant hot-swappable Power Supplies with N:1 or N:N redundancy.

Fan Units (sFU)

- The ISR 9288 (only) accommodates a vertical fan unit with 4 fans (sFU-4).
- The ISR 9288/9096 accommodates a horizontal fan unit with 8 fans (sFU-8).

1.3.2 ISR 9096/9288 Switching Topology

High performance computing clusters typically utilize Clos networks, more commonly known as “Fat Tree” or Constant Bisectonal Bandwidth (CBB) networks to construct large node count non-blocking configurations. A Clos network is a switch topology in which integrated non-blocking switch elements (crossbars) with a relatively low number of ports are used to build a non-blocking switch topology supporting a much larger number of endpoints.

The ISR 9096/9288 systems feature symmetrical Line Boards at both ends and interconnect Fabric Boards, thus implementing fat tree topology when the system is fully populated. sLBs are defined as Line Boards and sFBs as Fabric Boards. Each Line Board chip element is connected to each element of the Fabric Board through one or more InfiniBand connections. The shortest path from a given source to any other node is performed in three hops: hop 1 at the Line Board at one extremity of the system, hop 2 at the Fabric Board, and hop 3 at the Line Board at the other extremity.

NOTE



The number of available ports is limited when router modules are installed in the system.

The VFM groups all the Line and Fabric Boards in the Chassis and identifies them as a one switch entity, represented as a single icon.

Figure 1-4 illustrates the ISR 9288 InfiniBand internal switching matrix.

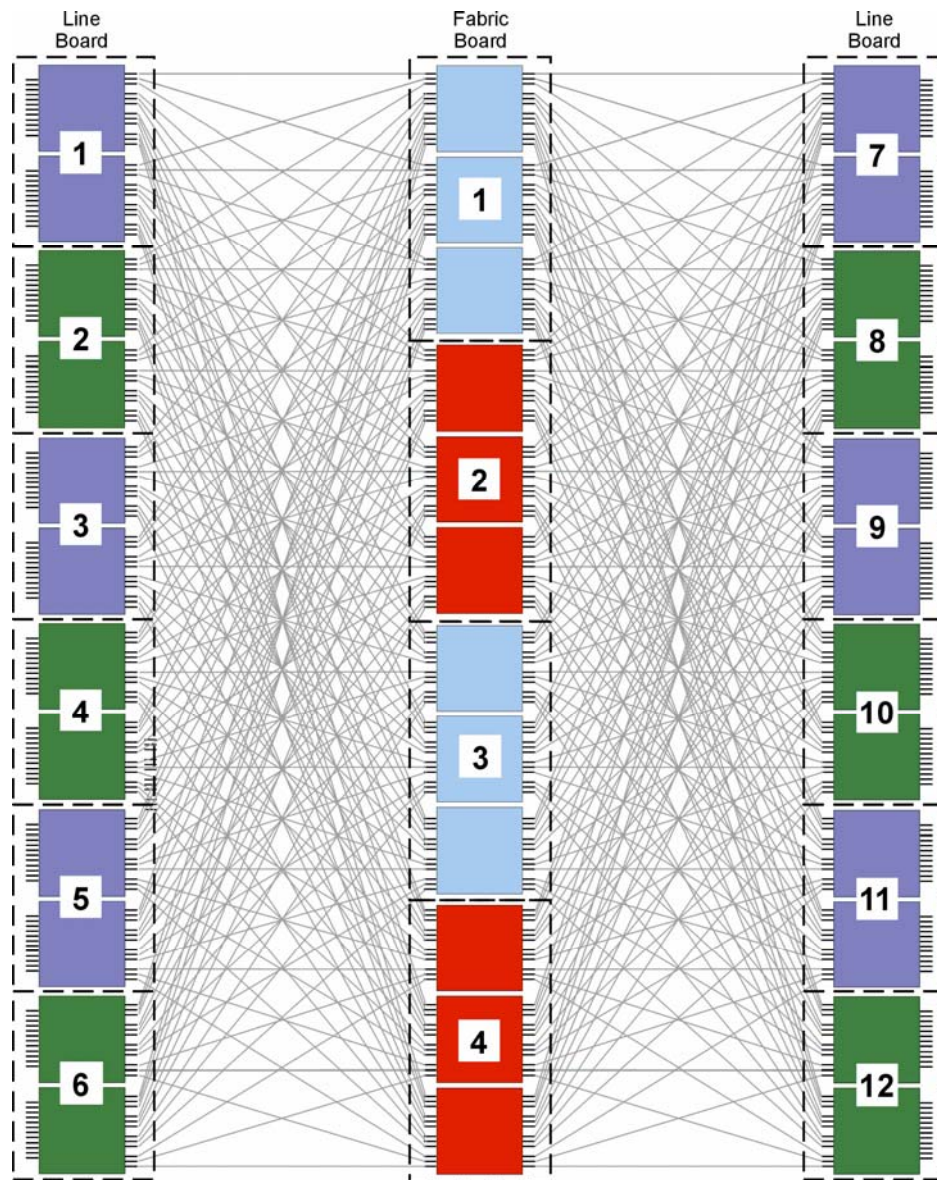


Figure 1-4. ISR 9288 InfiniScale Switching Topology - Fat Tree Topology

The ISR 9288/9096 external ports are configured to work in 12X/4X auto detection mode, meaning, they are capable of working in 12X mode in case they are cabled to another 12X enabled port.

The ISR 9288 features six symmetrical Line Boards (sLB-24) at both ends and four interconnect Fabric Boards (sFB)

Each sLB includes two 24 4X IB port chips. Each sFB has three 4X IB port chips.

Figure 1-5 illustrates the ISR 9096 InfiniBand internal switching matrix.

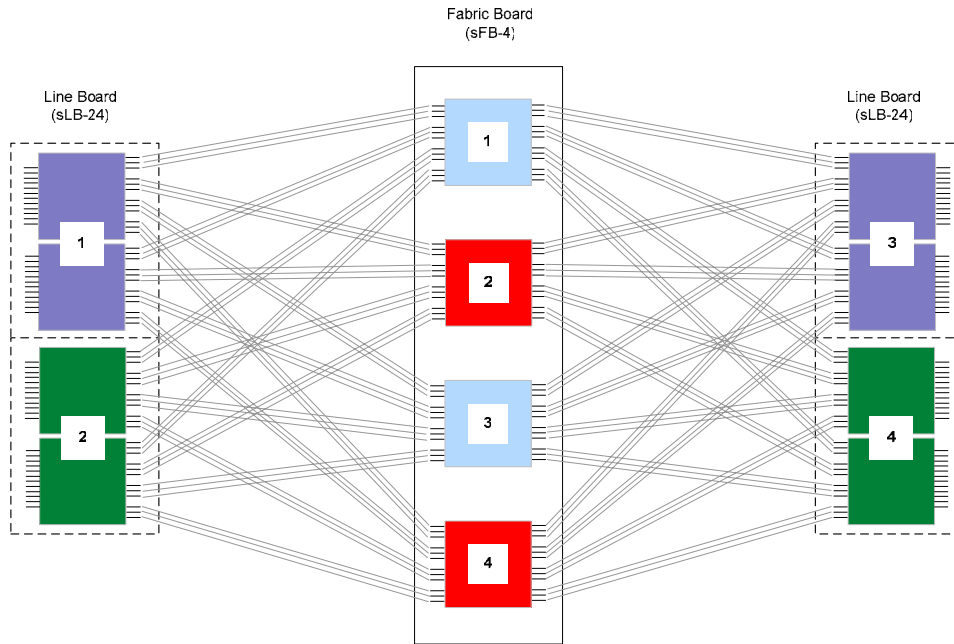


Figure 1-5. ISR 9096 InfiniScale Switching Topology - Fat Tree Topology

The chassis internal links (links between sFB-4 and sLB modules) are respectively configured for 4X mode when sLB-24 are installed in the system or 12X mode when sLB-8-12 are installed (future option). LEDs on the sFB-4 modules indicate 4X/12X link operation mode.

External 4X ports on the ISR 9096 can be grouped as a trio to form a single 12X port (even if the physical connectors are separate). The firmware configures those three ports as a single 12X group.

1.3.3 4X/12X Auto-Sensing

Three adjacent 4X ports starting from port 1 to 3 can be combined in a 12X port.

Each 4X port has an orange and a green LED. When a group of three 4X ports is operating as a 12X port, the LEDs of the lowest-numbered 4X are orange and green and function in the same manner as the LEDs on a 4X port. On the second and third ports only, the orange LEDs will light, meaning that the ports belong to the 12X group. In order for a group of three 4X links to be detected as a 12X link, all links must be connected simultaneously. In order for a group of three 4X links to be detected as a 12X link, all links must be connected simultaneously or the board must be turned on with all cables already plugged in.

The first port LED for each 12X trunk (group of three 4X ports) blinks for 7 seconds (alternating between the orange and the green) if the system detects a link that is lower than 12X. However, this does not affect link behavior. Regardless of the blinking LED, the link is still operating and fully functional (data can flow over the link).

1.4 Voltaire Switch Management

Management of Voltaire switch models is based on VoltaireVision™, Voltaire's Grid Interconnect Management Software. VoltaireVision management software is a powerful and comprehensive application suite that simplifies the management and proactively maximizes the performance and availability of InfiniBand enabled servers, networks, and storage grid environments. VoltaireVision manages all the fabric and networking resources in the grid, including the ability to automatically diagnose, optimally configure, provision, monitor traffic, partition, and fail-over.

Voltaire switches provide the following levels of management:

- Command Line Interface (CLI), described in Chapter 2 of this manual. The CLI can be connected via a serial connection or a Telnet /SSH session.
- Voltaire Fabric Manager, described in Chapter 3 of this manual. Provides a fabric-wide view of the switch fabric, with an advanced Graphic User Interface (GUI). The Fabric Manager can be connected via HTTP session.
- Voltaire Device Manager, described in Chapter 4 of this manual. Provides management of a switch, with an advanced Graphic User Interface (GUI). The Device Manager can be connected via HTTP session.

The system collects performance statistics and environmental monitoring data and supports an industry-standard Management Information Base (MIB). The Subnet Manager software automatically discovers the fabric topology and configures the hosts and switches for ease of operation.

Voltaire switches can also be managed with existing management systems using standard protocols like SNMP or InfiniBand subnet management.

Out-of-band management is performed by the means of the sMB fast Ethernet or RS-232 (console) interfaces. In-band management is derived from the InfiniBand network.

Figure 1-6 illustrates out-of-band management which is performed via the sMB management port.

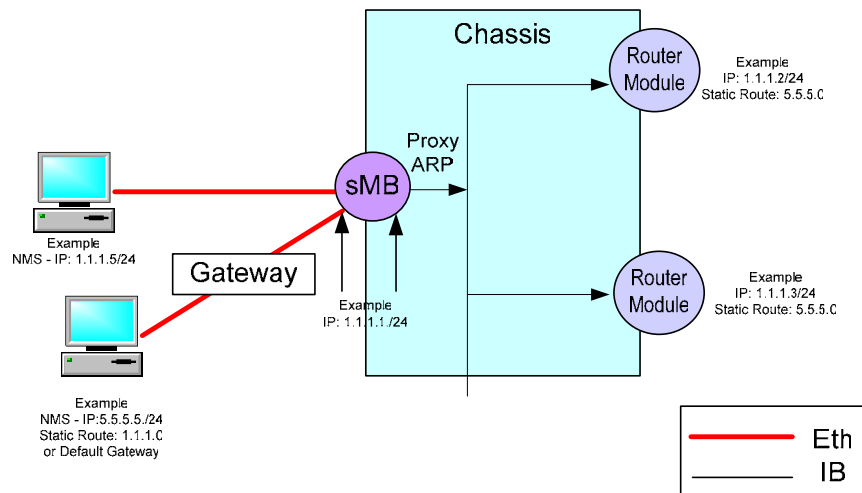


Figure 1-6. Out-of-band Management

Figure 1-7 illustrates in-band management which is performed via the router port.

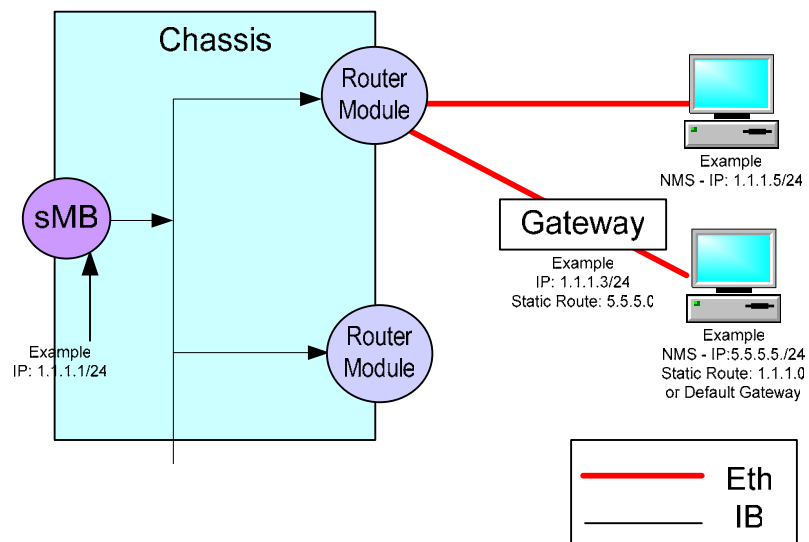


Figure 1-7. In-band Management

1.4.1 Redundancy Mechanism

The ISR 9096/9288 supports redundant sMBs. One sMB serves as the active system manager while the other is a standby management board. The latter takes control when it detects a failure of the active sMB. Failure can be caused by the Subnet Manager, or removal or failure of sMB or the sFB adjacent to the sMB. The redundancy mechanism maintains consistent replications of the system configuration parameters on both sMB modules.

The redundancy mechanism consists of three parts:

- Failover: Hardware, software or manual decision of when to switch from the master sMB to the standby sMB.
- Persistency: manual or online duplication of information from the Master sMB to the standby in order to continue working with the same information after the failover occurs.
- Duplicated IP: both sMBs will use the same IPs so the management station will always use the same IP address for system management.

Management boards redundancy is based on keep alive signals that are being sent from the active board to the passive board by the means of software.

1.4.2 Hot Swap Mechanism

ISR 9096/9288 hot swap refers to the ability to insert or remove a board without the need to power down the system.

That feature is facilitated by a set of micro-switches for each sFB-4/12 module and management board. The micro-switch sends an interrupt to the management CPU each time such insertion or removal of a module occurs. A blue LED is activated or deactivated to show when it is safe to remove or install the board.

During Hot swap of Fabric Boards or in case of failure, the management software detects and configures the system accordingly.

Upon removal of an sFB adjacent to an sMB (sFB 1 or 4) and if no other sMB is installed in the system, the Subnet Management temporarily freezes all applications until the sFB is replaced. If there is another sMB installed in the system, the latter takes over the management of the system.

1.4.3 Management Interfaces

Voltaire switches have the following management interfaces:

- The Fast interface (10/100 Ethernet) provides an interface to the CLI via a Telnet or an SSH session, and also provides an interface to third-party managers via SNMP. The SNMP configuration settings can be made using the CLI (as detailed on page A-65) or via the Device Manager (as detailed on page 4-40). The Fast interface also provides the interface to a remote FTP server for downloading new switch software versions and for uploading backup files. FTP configuration settings are made using the CLI and are detailed on page A-37. The Fast interface also provides an interface to the Voltaire Fabric Manager and Voltaire Device Manager GUI applications via HTTP session. (Out of band interface)
- The Serial interface (RS-232) provides an interface to the CLI. (Out of band interface)
- IPoIB – offers the same functionality as the Fast Ethernet interface (see above)

NOTE



Ethernet and IPoIB cannot be used simultaneously. IPoIB is a native InfiniBand interface of the system. No Ethernet is required and cabling is simplified.

Any machine connected to the IB system can connect to the ISR 9096/9288 management.

1.4.4 ISR 9096/9288 Management Interface Configuration

ISR 9096/9288 switches have several management interfaces resident on the sMB module.

Serial	The Serial interface (RS-232) provides an interface to the CLI.
FAST	The Fast interface is the Ethernet interface of the sMB module. In redundant sMB configurations, the IP address of the Fast interface is applied to the active sMB card. In the event of failure on the active sMB, the IP address of the Fast interface is moved to the backup sMB.
IB	The InfiniBand interface is the IPoIB interface of the sMB module. When managing the ISR 9096/9288 chassis from the IB fabric, in redundant sMB configurations, the IP address of the IB interface is used. In the event of failure on the active sMB, the IP address of the IB interface is moved to the backup sMB.
LOCAL	The Local interface is an optional IP address which can be attached to the Ethernet interface of the sMB module, in addition to the Fast interface IP address, and is intended for debug purposes. Unlike the Fast interface, the Local interface is configured per sMB module, regardless of the redundancy configuration and regardless of the sMB mode as active or standby. The Local interface is attached to a specific sMB module.
Internal	The ISR 9096/9288 sMB module has an additional internal Ethernet connection. This connection is used for replication and synchronization of the configuration parameters between the two sMB modules in a redundant sMB configuration. The user can change the subnet address of the Internal interface, which is set by default to 10.9.9.0. The IP address of the internal interface of each sMB module is (by default) 10.9.9.1 for the left-hand sMB and 10.9.9.2 for the right-hand sMB.



Chapter 2. Voltaire Command Line Interface (CLI)

In this Chapter

This chapter introduces the Command Line Interface (CLI), which provides commands to perform all necessary management functions, including software upgrades and maintenance.

This chapter contains the following sections:

- Getting Started with the CLI, on page 2-2
- First-Time Configuration, on page 2-6
- CLI Maintenance Commands, on page 2-14

NOTE



For the CLI Commands Reference refer to Appendix A, on page A-1.

2.1 Getting Started with the CLI

2.1.1 Interfaces for CLI Connection

A CLI session can be established via a serial RS-232 connection to the switch, or by connecting a Telnet or an SSH session to the switch Fast (Ethernet) interface; on ISR 9096/9288 switches, a CLI session can also be established by connecting a Telnet or an SSH session to the IB interface. Refer to *First-Time Configuration*, on page 2-6 for further information.

2.1.2 CLI Command Modes

The CLI is password protected. There are several CLI operation levels, each corresponding to a different level of interface operations. Each command mode requires a different password.

The following are the command modes:

- **Exec** mode – Allows view-only access of switch configuration parameters.
- **Privileged** mode – Allows the user to configure basic parameters such as date/time and reload (reset) switch, and to perform software and firmware updates.
- **Config** mode – Allows the user to configure all configuration parameters:
- **Debug** mode – Intended for use by Voltaire personnel only.

2.1.3 Prerequisite Tasks

Before configuring system parameters, make sure you have completed the hardware installation according to the relevant Installation Guide. Information about hardware installation of Voltaire switches can be found in the *ISR 9024 Installation Manual* and in the *ISR 9XXX Installation Manual* (the latter includes the ISR 9096 and the ISR 9288 Switches).

2.1.4 Keyboard Usage in CLI Operation

The CLI supports the use of the following special keys for the described functions:

Table 2-1. CLI Key Functions

Key	Function
?	The question mark (?) key lists all of the options available at that point in the command line, along with a brief description of the command. Each word may be truncated at any point after it is unique. If you enter a question mark (?) before a partial command (use a space after the mark), the system provides a list of commands that begin with that string.
Tab	Completes a partial command name entry. When you enter a set of characters that match the beginning of a command name and press the Tab key, the system completes the command name. If you enter a set of characters that could indicate more than one command, the system lists all available options.
Backspace	Erases the character to the left of the cursor.
Return	At the command line, pressing the Return key performs the function of processing a command. At the prompt on a terminal screen, pressing the Return key scrolls down a line.
Left Arrow	Moves the cursor one character to the left. When you enter a command that extends beyond a single line, you can press the Left Arrow key repeatedly to scroll back toward the system prompt and verify the beginning of the command entry.
Right Arrow	Moves the cursor one character to the right.
Up Arrow or Ctrl-P	Recalls commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.
Down Arrow or Ctrl-N	Return to more recent commands in the history buffer after recalling commands with the Up Arrow or Ctrl-P. Repeat the key sequence to recall successively more recent commands.

Key	Function
Ctrl-A	Moves the cursor to the beginning of the line (Note: this button combo does not work when the session is established with Minicom).
Ctrl-B	Moves the cursor back one character.
Ctrl-D	Deletes the character at the cursor.
Ctrl-E	Moves the cursor to the end of the command line.
Ctrl-F	Moves the cursor forward one character.
Ctrl-K	Deletes all characters from the cursor to the end of the command line.
Ctrl-T	Transposes the character to the left of the cursor with the character located at the cursor.
Ctrl-W	Deletes the word to the left of the cursor.
Ctrl-Y	Recalls the most recent entry in the delete buffer. The delete buffer contains the last ten items you have deleted or cut. Ctrl-Y can be used in conjunction with Esc Y.
Esc B	Moves the cursor from the middle of the word to the beginning.
Esc C	Capitalizes the character on which the cursor is pointing and moves it to the end of the word.
Esc D	Deletes from the cursor to the end of the word.
Esc F	Moves the cursor forward one word.
Esc L	Changes the word to lowercase at the cursor to the end of the word.

2.1.5 CLI Command Structure

All CLI commands follow a simple structure, and are capable of prompting for further information as the user types.

The CLI provides the following basic commands:

Command	Description
exit	Leaves current mode and return to previous mode.
?	Displays help text and usage for the CLI command.
? command	Displays help for the specific command.
end	Terminates the current management session.

Table 2-2. Basic Commands

For complete command descriptions and syntax information, refer to 0Appendix A, on page A-1.

2.1.6 CLI Case Sensitivity

The CLI is case sensitive. All keywords must be entered in lower case. Any user-defined strings, such as names or descriptions, may appear in any case, including mixed case. Case information for user-defined strings is preserved in the configuration.

2.1.7 CLI Command Prompts

The CLI command prompt includes the switch name. Configuration changes are automatically saved as they are made. The > or # sign respectively show if you are in Exec or Privileged configuration mode, as shown in the following table.

CLI command mode	Command Prompt
Exec	ISRXXX>
Privileged	ISRXXX#
Configuration (Config)	ISRXXX(config)#
Debug	For use by Voltaire personnel only.

2.2 First-Time Configuration

First-Time configuration is performed via CLI. This section describes the procedures for first-time configuration. It contains the following information:

- Collecting Required Information, on page 2-6.
- Connecting a Console, on page 2-6.
- Starting a CLI Management Session, on page 2-7.
- Configuring the Management Interface IP Address, on page 2-8.
- Configuring the Time and Date, on page 2-9.
- Configuring Passwords, on page 2-13.
- Verifying Configuration, on page 2-13.

2.2.1 Collecting Required Information

Use the *Voltaire switch installation checklist* (Table 2-3) to record the system and network information required for first time configuration.

The following information is required:

- Passwords—A password for users who will administer the switch. An additional password is needed to access the Privileged mode for advance configuration. The default password for Exec mode is **123456** and the password for Privileged mode is **voltaire**.
- Management interface IP address and subnet mask—The IP address and subnet mask of the Fast Ethernet interface (10/100 Ethernet).

Once you have completed the checklist, you are ready start the first time configuration of the switch.

System Parameter	Default
Exec mode password	password: 123456
Privileged password	password: voltaire
Management interface IP address and network mask	192.168.1.2
Subnet mask	255.255.255.0

Table 2-3. Switch Installation Checklist

2.2.2 Connecting a Console

Connect a PC with a terminal emulation program to the RS-232 console interface of the switch, as described in the *Installation Guide*. Make sure that the Switch terminal emulation program is configured as shown in Table 2-4.

Setting	Value
Terminal Mode	VT-100
Baud	38400
Parity	No Parity
Stop Bits	1 Stop Bit
Flow Control	None

Table 2-4. Terminal Emulation Configuration

2.2.3 Starting a CLI Session

To start a CLI management session via serial connection to the switch:

- Step 1** Connect the PC to the switch via its serial port, using the cable supplied by Voltaire.
- Step 2** Start a HyperTerminal client (or compatible) on the computer.
- Step 3** Configure the terminal emulation parameters as described in Table 2-4.
- Step 4** Type the appropriate user name password at the logon prompt (the default user name is `admin` and default password is `123456`):
- Step 5** To change to Privileged mode, type `enable`.
- Step 6** Type the password at the prompt (the password is `voltaire`).
- Step 7** Issue the appropriate CLI commands to complete the required actions.

2.2.4 Configuring the Management Interface IP Address

The switch must be configured with an IP address to allow remote management. Use the following table to enter the appropriate commands.

To configure the IP address:

	Command	Description
Step 1	Enable [password]	Enters Privileged mode (from Exec mode) (the default password is voltaire):
Step 2	config	Enters Config mode from the Exec mode. Type the password when prompted.
Step 3	interface fast	Enters Fast interface configuration.
Step 4	ip-address fast set <192.168.70.60> <255.255.255.0> Note: The above IP address and mask are used as an example.	Sets the IP address of the Fast interface.
Optional in ISR 9096/ 9288 Switches	ip-address-ib set <192.168.70.60> <255.255.255.0>	Sets the IP address of the IB interface. In ISR 9096/9288 switches, the active management interface can be set to the sMB board Fast or IB interface. This command can be accessed via the Config/Interface IB menu. See next section for further information.
ISR 9096/9288 Switches	management-interface set	Sets the active management interface to the Fast or IB interface. See next section for further information. Note —do not configure the IP address of the IB interface on the same subnet as the IP address of the Fast interface.
Step 5	Exit	Exits Fast interface configuration mode.

2.2.5 Configuring the Management IP Address in ISR 9096/9288 Switches

The active management interface of the ISR 9096/9288 switch sMB module can be set to either the Fast interface or the IB interface (not both interfaces simultaneously). However, CLI sessions can be established through both interfaces simultaneously.

The IP address of the IB interface should not be configured on the same subnet as the IP address of the Fast interface.

Configuring the Fast interface as the Management Interface

This is the default system configuration.

To check which interface is the active management interface, use the following CLI command:

```
ISR-9096/9288 (config-if-fast)# ip-address-fast show

local ip 172.25.2.38
ip mask is 255.255.0.0
broadcast ip is 172.25.255.255
management interface is eth0:1
```

The last line in the CLI output above specifies that the Fast interface is the active management interface.

To set the Fast interface as the active management interface:

```
ISR 9096/9288 (config-if-fast)# management-interface set
```

Configuring the IB Interface as the Management Interface

To check which interface is the active management interface, use the following CLI command:

```
(config-if-IB)# ip-address-ib show

ip is 192.168.1.8
ip mask is 255.255.255.0
broadcast ip is 192.168.1.255
management interface is IB
```

To set the IB interface as the active management interface:

```
ISR 9096/9288 (config-if-IB)# management-interface set
```

2.2.6 Configuring the ISR 9096/9288 with I/O Modules

When plugged into an ISR 9096/9288, all IPR and FCR hardware modules are automatically identified by the Chassis Management. I/O module configuration and monitoring is embedded within the switch management via the Subnet Management and is performed through the VDM interfaces (both GUI & CLI).

To manage the ISR 9096/9288 and all its I/O router modules using the single active management interface I/O modules, ISR 9096/9288 IP Addresses must first be configured via the CLI. Once configured, the ISR 9096/9288 sets the internal management IP routes.

NOTE

Do not physically connect the I/O module local fast Ethernet Management port to the same physical network when using Ethernet as active management.

Management over the FAST (ETH) Interface

When the system is configured to manage a chassis with I/O modules and the FAST Ethernet is the selected management interface, the sMB automatically enters into Proxy-ARP mode. This allows the connection between the manager which resides on the ETH network and the I/O modules residing on the IB network.

In this mode, configure the interfaces and I/O modules as follows:

- Step 1** Configure the FAST interface (IP address, subnet mask)
- Step 2** Configure the IB interface to the same values of the FAST interface, same IP address and same subnet mask.
- Step 3** Configure the I/O modules, as follows:
 - Make sure the IP address of each module is on the same subnet as the FAST interface.
 - Configure each module using the *io IP-address set* CLI.

The configured modules can be viewed using the *io show* CLI.

Management over the IB Interface

In this case, the system is configured to manage a chassis with I/O modules, and IB is the selected management interface.

In this mode, configure the interfaces and I/O modules as follows:

- Step 1** Configure the IB interface (IP address, subnet mask)
- Step 2** Configure the I/O modules as follows:
- Make sure the IP address of each module is on the same subnet as the IB interface.
 - Configure each module using the *io IP-address set* CLI.

The configured modules can be viewed using the *io show* CLI.

Use the following table to enter the appropriate commands.

To set the I/O address:

Use the following table to enter the appropriate commands.

	Command	Description
Step 1	Enable [password]	Enter Privileged mode (from Exec mode). (the default password is <i>voltaire</i>):
Step 2	io show	Use the <i>io show</i> CLI command to view modules
Step 3	Config	Enter Config mode from the Exec mode. Type the password when prompted.
Step 4	Cluster	Enter cluster configuration.
Step 5	ip-address-ib set <slot> <position> <192.168.70.60> <255.255.255.0>	Set the IP address of the I/O module in a specific slot and specific position in the ISR 9096/9288 switch
Step 6	Exit	Exit Fast interface configuration mode.

IPR Management Interface Configuration

When the system is configured with an IPR module, you can use the IPR Ethernet interface as the active management channel; this allows you to manage both the IPR itself and the ISR 9096/9288 switch.

Use the following guidelines when planning this type of configuration:

- Configure the Ethernet interface of the IPR module on the same subnet as the Fast interface.

2.2.7 Configuring the Time and Date

Use the following sequence to configure the switch time and date parameters. The time and date will appear on event reports that are time stamped.

	Command	Description
Step 1	Enable [password]	Enter Privileged mode (from Exec mode); the default password is <code>Voltaire</code> .
Step 2	Clock set 072805202003	Enter time and date in military format. For example, time. 5:20 AM; date, July 28, 2003.

2.2.8 Configuring Passwords

Use the following procedure for configuring passwords for Exec and Privileged mode access to the RS-232 console interface and to the Fast Ethernet management interface (used for establishing a CLI session via Telnet or SSH).

NOTE



The factory default password for Exec mode is 123456 and for Privileged mode is voltaire.

	Command	Description
Step 1	Enable [password]	Enters Privileged mode (from Exec mode)
Step 2	password update [admin enable]	Sets the Privileged and Exec mode passwords
Step 3	exit	Exits Privileged mode

2.2.9 Verifying Configuration

From the Exec/Privileged mode, verify the system parameters using the steps below.

	Command	Description
Step 1	version show	Displays the version of the current switch software
Step 2	ftp show	(Optional) Displays the FTP client configuration
Step 3	fast-interface show	Displays IP interface address and configuration
Step 4	clock show	Displays the system clock

2.3 CLI Maintenance Commands

This section explains how to configure switch parameters and contains information on the following topics:

- Prerequisites, on page 2-14
- Updating Software, on page 2-14
- Backing up the Switch Configuration, on page 2-17

2.3.1 Prerequisites

Before performing any switch maintenance tasks, make sure you have configured system parameters as described in *First-Time Configuration*, on page 2-6.

NOTE



Certain configuration tasks, such as identifying a location from which to download software, are optional, and may not have been performed during initial configuration. You may perform these tasks at any time, via the CLI or the GUI. Where necessary, this chapter will identify the relevant tasks and commands.

2.3.2 Updating Software

The same software image can be used to manage either an ISR9096 system or ISR 9288 system. The software automatically detects the system type and executes the suitable device management operations.

The switch is designed to run on a continuous basis without significant maintenance. However, from time to time, you may need to install updated software or modify device configuration. The switch stores a software image (along with configuration files, log files, and other information) on a local file system. This file system is stored on an internal flash memory.

NOTE



Always review the README file before making updated software available to the switch.

If you plan to use the CLI `update software` command to update the switch software from a remote FTP site, be sure to set the FTP server IP address through the CLI FTP mode commands and be sure the necessary file is located on the FTP server. You can find the FTP mode commands on page A-39 of this manual.

- The software upgrade updates the entire boot image, and not individual components.
- A configuration merge is performed: old values are saved and new fields are added.

The software upgrade procedure should last approximately three minutes.

2.3.3 Prerequisites for Updating Software

The user receives the update in a predefined media (e.g. CD), and copies it to a known location on an FTP server within his LAN.

The user defines the FTP parameters via the CLI in Config mode and using the FTP menu:

- `ftp server: <ftp server>`
- `ftp username: <authenticated ftp username>`
- `ftp password: <ftp password>`

To update switch software, perform the following steps:

I. Copy the New Software to the FTP Server

- Step 1** Make sure that the FTP server is active. If a default gateway has not been configured, the FTP server must be located in the same subnet as the switch management port.
- Step 2** Copy the new version files to the FTP root directory.

II. Configure FTP Server Settings

Identify the location from which to retrieve the updated software. If the default download location is not appropriate, you can reset it.

If this location is not the one from which you would normally retrieve updated software, use the steps in the following table to set the appropriate download location.

	Command	Description
Step 1	Enable	Enter Privileged mode (from Exec mode).
Step 2	config	Enter Config mode (from Privileged mode).
Step 3	ftp	Access the FTP menu (from Config mode)
Step 4	server <ftp.voltaire. com>	Configure the IP address of the FTP server.
Step 5	username <ftp>	Configure the user name for FTP server access.
Step 6	password <123>	Set the user password to access the FTP server.
Step 7	ftp show	After the update is complete, execute this command to verify the new settings.

III. Update Switch Software

The `update software` command (in Privileged mode) makes a new version of switch software available to the switch for boot purposes. Use the following steps to verify that the new version of software is available:

	Command	Description
Step 1	Enable	Enter Privileged mode (from Exec mode).
Step 2	version show	Checks the current software version.
Step 3	update software <ftpboot-path>	Starts the update software process. This can take several minutes. Update software version.

NOTE



In ISR 9096 and ISR 9288 switches, an additional command (`update firmware`) is required to update the firmware of the switch; in ISR 9024 switches, the `update software` command updates both the software and the firmware.

2.3.4 Backing up the Switch Configuration

It is recommended that you back up the switch configuration settings and topology file periodically. The switch configuration settings can be restored when required by using the `import` command available in the FTP menu.

	Command	Description
Step 1	<code>Enable</code>	Enter Privileged mode (from Exec mode).
Step 2	<code>config</code>	Enter Config mode (from Privileged mode).
Step 3	<code>ftp</code>	Access the FTP menu (from Config mode)
Step 4	<code>server</code>	Configure the IP address of the FTP server.
Step 5	<code>username</code>	Configure the user name for FTP server access.
Step 6	<code>password</code>	Set the user password to access the FTP server.
Step 7	<code>export <ftproot-path><file-name></code>	This command uploads the configuration settings of the switch to the FTP server.
Step 8 (optional)	<code>exportFile topology <ftproot-path></code>	This command uploads to the FTP server a file with a log of network topology changes (of the nodes in the network). This is intended mainly for debug/testing needs.
Step 9 (optional)	<code>exportSm <ftproot-path></code>	This command uploads a file to the FTP server with the SM log. This is intended mainly for debug/testing needs.

2.3.5 Software and Firmware Upgrade Process

Requirement for Firmware Upgrade

In addition to the software that runs on the Management Boards (sMBs), there is firmware running on each InfiniBand switch ASIC. The software upgrade process automatically detects the firmware level in each ASIC and upgrades it if necessary.

Switch ASICs are located on each sFB and sLB module.

Of the four possible sFB-12 (Fabric Board) modules, two are unique in that they are connected to the CPU units on the sMB modules. These two are the leftmost and on the rightmost sFB-12 modules (slots sFB1 and sFB4).

Upgrade Process

I. Update Procedure for a SINGLE sMB installed in the Switch

During the ISR 9XXX upgrade process, a single sMB module is installed in the chassis.

To upgrade the ISR 9096/9288 with a SINGLE sMB installed:

- Step 1** Connect to the sMB via a serial console or a Telnet terminal.
- Step 2** Update the sMB software by activating the software upgrade process from the CLI, using the **Update Software** command. The upgrade process installs the new software image onto the sMB Flash memory and reboots.
- Step 3** Upon booting, the software automatically detects the firmware version on the sFB-12 unit connected to the sMB. If it detects an older version, it is automatically upgraded to the new revision.

Note: When performing an automatic firmware upgrade (as described above), the system issues a request to power cycle the ISR 9XXX chassis. This request appears on all terminals.
- Step 4** On the next boot, invoke a firmware upgrade for the entire chassis by using the **CLI Update Firmware** command.

II. Upgrade Process for Redundant sMB Configuration

When a switch configuration includes a second sMB, upgrade its software by performing the following steps:

To upgrade the ISR 9096/9288 with two sMBs installed:

- Step 1** Make sure only one sMB is installed in the chassis. If two sMBs are installed, remove the second sMB.
- Step 2** Follow the steps described in the previous section (Update Procedure for a SINGLE sMB installed in the Switch).
- Step 3** Power down the system and replace the first sMB module with the second sMB.
- Step 4** Follow the steps described in the previous section (Update Procedure for a SINGLE sMB installed in the Switch).
- Step 5** Power down the system and install both sMB modules into the chassis.
- Step 6** Power up the system with both sMBs.



Chapter 3. Voltaire Fabric Manager (VFM)

In This Chapter

This chapter provides system information and requirements for working with the Voltaire Fabric Manager (VFM) application. This includes information on the following topics:

- Fabric Manager Description, on page 3-2
- Fabric Manager Installation, on page 3-3
- Getting Started with the Fabric Manager, on page 3-5
- Fabric Manager Operation, on page 3-6
- Managing Alarms and Events, on page 3-22
- Viewing Properties Data, on page 3-32
- Information Views, on page 3-35
- Configuring the SM, on page 3-41
- Configuring Nodes, on page 3-43
- Configuring the Subnet Manager, on page 3-44
- Configuring Quality of Service (QoS), on page 3-46
- Configuring Routing Algorithms, on page 3-53

3.1 Fabric Manager Description

The Voltaire Fabric Manager (VFM) is an embedded application with a web-based GUI that provides InfiniBand fabric management functionality.

The Voltaire Fabric Manager provides a color-coded topology map of the InfiniBand fabric which allows users to view the status of the managed InfiniBand fabric. Using the VFM GUI, users can drill down to obtain a wide range of port and node information.

Voltaire Fabric Manager is available for the following hardware platforms:

- ISR 9096 switch system
- ISR 9288 switch system
- ISR 9024 switch system

3.1.1 Voltaire Fabric Manager Components

The Voltaire Fabric Manager is comprised of the following management components:

- Subnet Manager (SM)—Provides fabric discovery and configuration.
- Subnet Administration (SA)—Serves as the subnet database, answering queries from other subnet entities.
- Performance Management (PM)—monitors the port counters of the fabric elements and generates notifications for port errors.
- Voltaire Fabric Manager User Interface—Fabric monitoring and configuration via GUI and CLI.
- Voltaire Device Manager User Interface—Device monitoring and configuration via GUI and CLI.

3.1.2 Voltaire Fabric Manager Main Functionality

Voltaire Fabric Manager provides the following functionality:

- Alarms
 - Color-coded display of alarmed objects in all relevant Fabric Manager display windows
 - Current Alarms reports and ability to manually clear alarms
 - Setting and filtering alarms
- Viewing fabric connectivity
- Management and monitoring of Fabric parameters (e.g., LMC value, Sweep interval, SM info, Logging verbosity level, etc.)
- Enhanced monitoring of fabric elements (e.g., Node info, Port info, Port counters and performance)
- Provides advanced Performance Management (PM) of ports in the fabric
- Supports Quality of Service (QoS) functionality, including SL to VL and VL-Arbitration mechanisms
- Grouping Information

3.2 Fabric Manager Installation

3.2.1 System Requirements

The minimum system requirements specifications for a station running the application are listed in Table 3-1.

Component	Specification
Workstation	Pentium IV processor or equivalent
Operating System	Windows 2000 and above OR Linux
Hard Disk	100 MB free disk space
Memory	512 MB RAM
Web Based Support	Explorer 6.0 or above, Netscape or Mozilla
Monitor/Display	At least 17" recommended

Table 3-1. Fabric Manager System Requirements

3.2.2 Installing the Sun Java Web Start Application

Install the Sun Java Web Start application (Version 1.0.1 or below) on the Workstation; Install it via the Internet using the link in the GUI, or via the Voltaire Installation CD.

3.2.3 Installing the Sun Java Web Start Application on a Linux Workstation

Installing the Sun Java Web Start Application on a Linux Workstation:

- Step 1** Execute the file with the command:
- ```
/j2sdk-1_4_1_03-linux-i586-rpm.bin
```
- An RPM file is created.
- Step 2**      Execute the RPM file with the command:
- ```
rpm-ivh j2sdk-1_4_1_03-fcs-linux-i586.rpm
```
- Step 3** Unzip the file javaws-1_0_1_02-linux-int.zip
- Run the command:
- ```
./install.sh
```
- Enter the following directory when the program waits:
- ```
/usr/java/j2sdk1.4.1_03/
```
- The Java Web Start is ready for use.
- For additional help go to:
- <http://java.sun.com/j2se/1.4.2/install-linux.html> - requirements
- and ;
- <http://java.sun.com/webapps/download/DisplayLinks>

3.3 Getting Started with the Fabric Manager

To start the application:

- Step 1** Configure the IP address of the active management interface using the CLI through a serial console connection. Refer to page 2-8 for instructions on these configuration settings.
- Step 2** Open the Internet Browser and connect to the fast Ethernet IP address (for example: <http://192.168.1.2>). The Voltaire Fabric Manage Initiate Window is displayed. This window varies according to the device type, as shown in the example in Figure 3-1.



Figure 3-1. Voltaire Fabric Manager Initiate Window

The Voltaire Fabric Manager Initiate Window contains the following icons:

Icon	Description
	Launches Voltaire Graphic Device Manager, which is described in <i>Chapter 4</i> .
	Launches the Voltaire Fabric Manager.
	Click to download the Sun Java Web Start application, which must be installed in order to use the Voltaire Vision GUI.

Table 3-2. Voltaire Initiate Icons

NOTE

When opening the Voltaire Fabric Manager Initiate Window for the first time, click  to start the Sun Java Web Start installation. The computer that is being used must be connected to the Internet for successful Java Web Start package download from Sun's website.

Step 3

To start the Voltaire Fabric Manager application, click  from the Voltaire Fabric Manager Initiate Window.

3.3.1 Login to the Fabric Manager

After the Voltaire Fabric Manager application is started, the Login window is displayed:

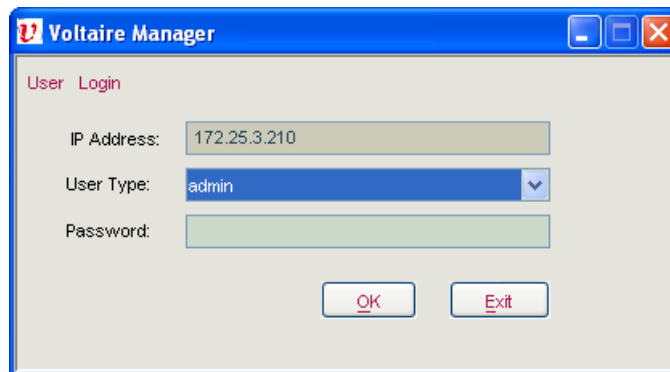


Figure 3-2. Login Window

The Fast IP address of the Subnet Manager to which the Fabric Manager is connected is displayed in the read-only *IP Address* field.

Step 1 Select the *User Type*.

The Voltaire Fabric Manager supports three *User Types*, each with a different authorization level.

- Administrator user type. This user can perform all configuration and provisioning operations. Default password: 123456
- Manager user type. Enables you to set the target parameters. Default password: voltaire
- Guest user type. This user can only view device configuration and status information. Default password: Voltaire

Step 2 Enter the *Password* and click **OK**. The Voltaire Fabric Manager main window (Figure 3-4) is displayed.

NOTE

The login password is case sensitive.

3.3.2 Terminating the Fabric Manager

The exit feature shuts down the Voltaire Fabric Manager application; the switch continues to run with its last configuration (even after the GUI is shut down).

To terminate the Voltaire Fabric Manager:

- Step 1** Select *File—Exit* from the main menu. A warning message is displayed:

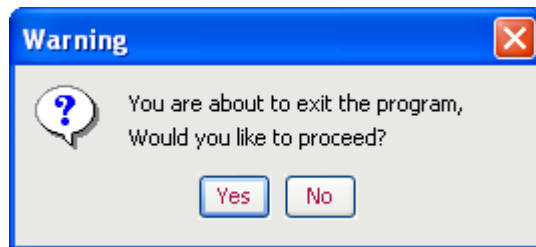


Figure 3-3. Exit Warning Message

- Step 2** Click **Yes** to confirm.

3.4 Fabric Manager Operation

3.4.1 The Fabric Manager Main Window

The Main Window provides access to most of the SM functions and provides a view of the topology managed by the system, with color-coded visual indicators that display alarms and important events in the managed fabric. Figure 3-4 shows the main areas of interest in the Main Window:

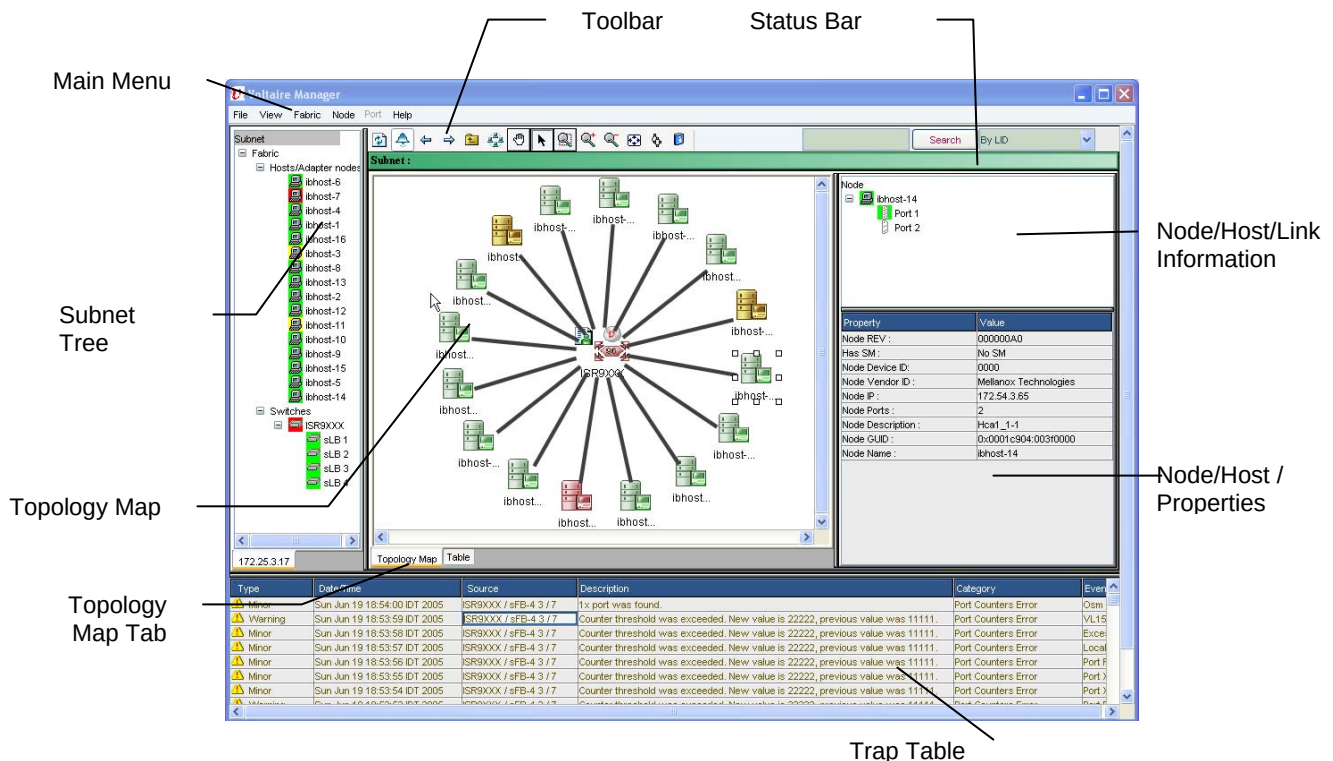


Figure 3-4. Fabric Manager Main Window

3.4.2 Color Coding in the Fabric Manager

In the Fabric Manager windows, the following color coding is used to indicate the status of objects and events:

- **Green** – indicates a normal operating state or a normal system event.
- **Yellow** – indicates a Minor problem, such as a counter threshold exceeding a pre-defined threshold, and Minor and Warning types of events.
- **Red** – indicates a Critical problem, such as a failed port or board, and a Critical event.

Color coding is defined according to severity. For more information, refer to Event Notification, on page A-1.

3.4.3 Finding the Source of Alarms in the System

When a Minor or Critical alarm exists in the fabric, you can use the Fabric Manager to drill down and detect the source of the alarm.

When there are no alarms in the fabric, the status bar at the top of the Topology map is colored green. Should an alarm exist in the fabric, the color of the status bar changes to indicate the highest severity alarm in the fabric.

Once you have detected that an alarm exists, view the topology map and look for the node where the alarm originated; its color will reflect its alarm status.

You can also right click the alarm in the Event Log and select *Go To Node* from the context sensitive menu. The map focuses on the alarmed node/host (small rectangles drawn around the node on the topology map) and the focus of the node/host information pane of the main window also changes to display the alarmed ports/objects.

For more information on alarm handling, refer to *Managing Alarms and Events* on page 3-22.

Also, refer to Chapter 5 for information on use of other advanced fabric diagnostic capabilities.

The Privileged Mode Section A.5 details how to manage Events and Alarms via the CLI.

3.4.4 Topology Map

The Topology Map provides a view of the fabric topology, using color-coded icons and connecting lines to represent the nodes (hosts and switches). It is fully synchronized with the Subnet Tree and the Node Information.

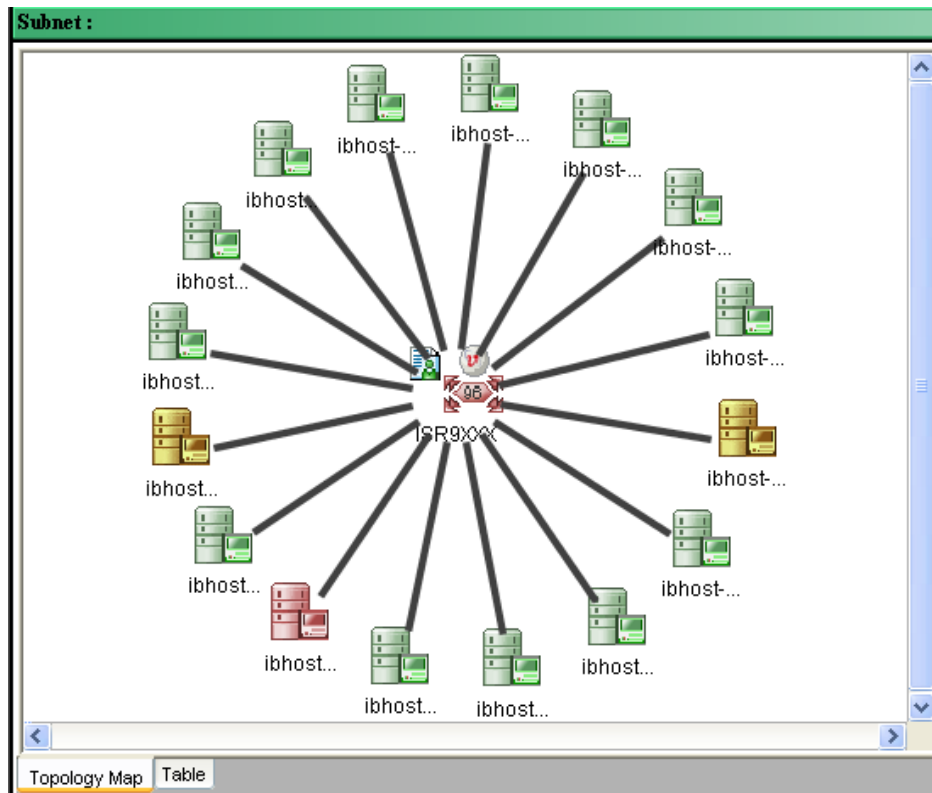


Figure 3-5. Topology Map

The Topology Map displays the following types of icons, depending on the configuration of the fabric: Icons are color coded to indicate their alarm status. Table 3-3 describes the Topology Map icons.

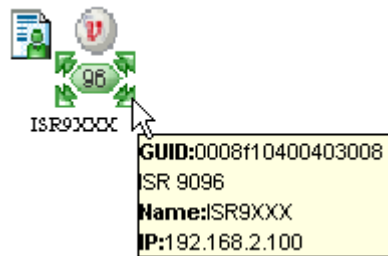
Icon	Description
	This icon is an example representing a managed Voltaire InfiniBand Switch grouping Voltaire modules in a single icon.
	Represents an InfiniBand router module.
	Represents a Host.
	Represents a switch. A number inside the icon indicates the type of switch, e.g., 288 indicates an ISR 9288 switch, 96 indicates an ISR 9096 switch.
	Represents a Voltaire Fibre Channel Router (FCR) module.
	This icon can be displayed on a device icon; when displayed, it indicates that the device is a Voltaire device; this can either be a device manufactured by Voltaire (such as an ISR 9288 switch for example), or a device with the Vendor ID Voltaire set in the device configuration.
	This icon shows that the device is managed, i.e. a Subnet Manager (SM) is installed in the device.
	Connecting lines between icons represent the physical connections between devices. A thin line indicates a single connection, while lines of double thickness indicate a multiple connection between devices.

Table 3-3. Topology Map Icons

The name of the device is displayed beneath each icon. If there is no name configured for the device, its GUID number is displayed. The device name is set via the CLI or the Voltaire Fabric Manager.

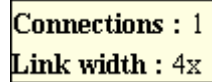
Tool Tips in Topology Map

You can display a tool tip for device icons and connecting lines by positioning the cursor above the icon or line. The following is an example of a tool tip.



For nodes, the following information is displayed: the device GUID, the name of the device, and the IP (for switches only).

For lines, the number of connections between devices and the link speed are displayed.



Moving Icons on the Map

The location of the device icons can be rearranged in the Topology Map. To move a device icon, click and drag the icon to the desired location. The icon location can be reset by clicking  (Hierarchical layout button) on the toolbar.

NOTE

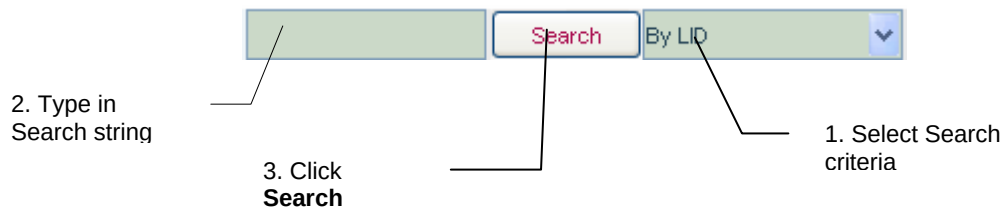


You can select multiple icons by clicking and dragging the mouse cursor over the group you want to select.

Resizing Icons

You can resize icons by positioning the mouse cursor on one of the squares displayed around the icon, and dragging it to the desired size.

Search in the Topology Map



You can perform a search for a specific object in the Topology Map by using the toolbar search box.

To perform a search:

- Step 1** Select the search criteria: you can search according to the node LID, according to the node name or according to port GUID.
- Step 2** Position the cursor in the text box and type in the node name. The search string is case sensitive and there is no support of wild cards; the node name must be typed in exactly as displayed in the topology map.
- Step 3** Click the **Search** button

When the search is done, the node icon is automatically selected in the map and the Node Info and Node Properties areas focus to display the information of selected node.

3.4.5 Main Menu

The main menu provides access to Voltaire Fabric Manager functions listed in Table 3-4.

In general, when a menu heading is not available for selection it appears grayed out and in slightly raised type.

Menu	Submenu Action
File	Exit —Logs out of Fabric Manager and terminates all Fabric Manager processes.
View	View Status Line —Shows/hides the Status Bar. View Tree —Shows/hides the Subnet Tree. View Events — Shows/hides the online Events Log.

Menu	Submenu Action
Fabric	SM Properties—Opens the SM Properties window, which is used to view and configure Subnet Manager parameter settings. This window is described in Section 3.9, on page 3-44. Fabric Inspect. This feature is described both in the VFM and the Diagnostic chapters, on pages 3-1 and 6-1, respectively. Settings—opens the Fabric Inspect dialog box, which allows you to select which events are reported in the Event Log and/or to change PM settings. Event Log—Displays the Events Log in a browser window. Error Log—Displays the Errors Log in a browser window. Bad Ports Log—Displays a log of the bad ports in the switch. Fabric Statistics—opens a CSV file in a browser window, displaying statistics regarding the ports in the fabric (this feature must be enabled in the CLI using the pm report-enable command). Cluster Configuration—Future option. Quality of Service—opens the Quality of Service dialog box, which is used to view and configure QoS parameters. This window is described on page 3-46. Routing Configuration – Opens a dialog box used to configure the switch routing algorithm. This window is described on page 3-53. Current Alarms—Opens the Current Alarms window, which lists the open alarms in the fabric. This window is described on page 3-22.
Node	This menu is only active when a node (HCA or switch) is selected in the Fabric Manager main window. Node Open—opens the Node information view of the node selected in the topology map. Launch Device Manager—launches the Voltaire Device Manager application with a connection to the switch selected in the topology map. See Chapter 4 for descriptions of the relevant Voltaire Device Manager applications. Grouping Info—shows the internal hardware configuration of a switch system in a single icon. Telnet—establishes a Telnet session with the switch selected in the topology

Menu	Submenu Action
	map; once the Telnet session is established, you can use the Command Line Interface (CLI) to view and set device parameters. See Chapter 2 for instructions on CLI usage. Configuration—opens the Node Configuration dialog box which is used to view and configure node parameters. Monitor—Future option. Advanced Routing Mark SFB— Add sFBs to the SFB List, when configuring routing through the Fabric Manager. Unmark SFB—Remove sFBs from the SFB List, when configuring routing through the Fabric Manager. Routing Configuration—To configure routing for a node, as described on page 3-53. Clear Alarms—Clears alarms in the Current Alarm log; see page 3-24 for more information.
Port	This menu is only active when a port is selected in the Fabric Manager main window. Port Info—Displays the Port Information dialog box, with information on the selected node. This window is described on page 3-40. Port Counters—Displays the port PM counters, with information regarding the port performance. This window is described on page 3-22. Attached to—Displays the nodes which the port is connected to, at both ends of the link.
Help	About—Displays the Voltaire Fabric Manager software version.

Table 3-4. Main Menu Options

3.4.6 Right Click/Context Sensitive Menu

You can use the right click menu in the Topology map, in the event log and in other Fabric Manager windows and dialog boxes. The menu options displayed depend on where you performed the right click; menu actions are identical to those described in Table 3-4.

3.4.7 Subnet Tree

The Subnet Tree displays all the elements monitored by the Fabric Manager in a top down, hierarchical format.

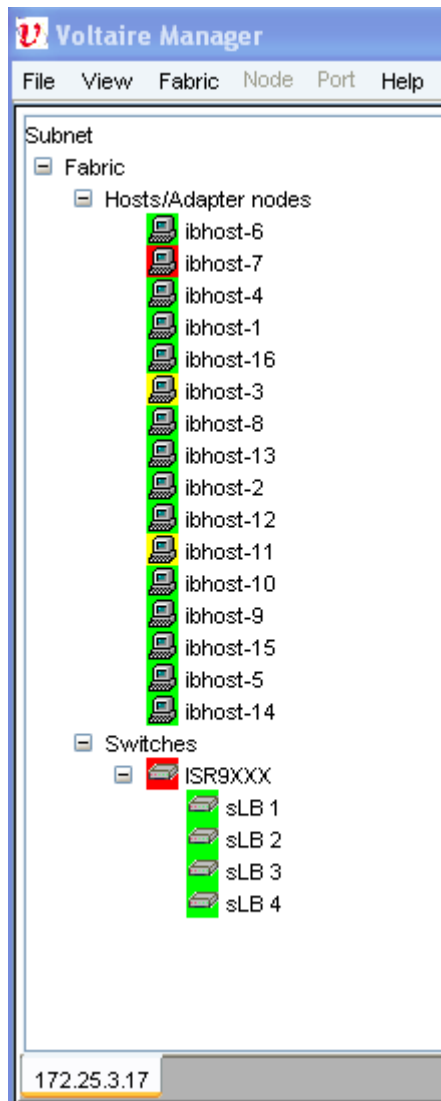


Figure 3-6. Subnet Tree

The IP address displayed at the bottom of the subnet tree window is the fast Ethernet IP address of the switch.

Table 3-5 describes the objects displayed in the Subnet Tree.

Object	Description
Subnet	The highest level, representing the entire fabric managed by the Voltaire Fabric Manager. When this object is selected, the main window is displayed as shown in Figure 3-4.
Nodes	Logical object which represents the hosts/adaptor nodes and switches in the fabric. This object has no distinct selection options.
Hosts/ Adapter nodes	Logical object, which represents all the servers (HCAs) in the fabric. Click on this object to display the Hosts List, described on page 3-36. Expand this object to display the hosts in the fabric in the subnet tree.
Hosts	Underneath the Hosts logical object, the subnet tree displays the hosts in the fabric. Click on a specific host to display the Host Information window, described on page 3-37.
Switches	Logical object which represents all the switches in the fabric. Click on this object to display the Switches Lists, described on page 3-37. Expand this object to display in the subnet tree the switches in the fabric.
Switch	Underneath the Switches logical object, the subnet tree displays the switches in the fabric. Click on a specific switch to display the Switch/SLB info window, described on page 3-39.
sLB	This object is only displayed underneath ISR 9096/9288 switches. It represents a Line board in the ISR 9096/9288. Click this object to display the Switch/SLB info window, described on page 3-39.
sRBD	This object is only displayed underneath ISR 9096/9288 switches. It represents a Router Blade Drawer, which has router modules (also referred to as I/O modules) inserted in the sRBD slots, up to three modules per sRBD. The user also has the ability to see in which slot they are installed.

Table 3-5. Subnet Tree Objects

Expanding and Collapsing Objects in the Subnet Tree

In the Subnet Tree, whenever an object has children, a  icon is displayed to the left of the object icon. To expand the object and reveal the children assigned to it, click once on the  icon. The children are immediately displayed underneath the parent and the  icon is displayed to the left of the object icon. Click once on the  icon to collapse the parent object (hide the children).

3.4.8 Toolbar

The toolbar is displayed at all times at the top of the main window. It is divided as follows:

- General buttons—displayed in all Fabric Manager views.
- Topology Map buttons—displayed only when the Topology Map is displayed.

All toolbars have a tool tip. Position the mouse cursor above a toolbar icon to display the name and functionality of the icon.

The buttons and the functions they invoke are described in Table 3-6.

Table 3-6. Fabric Manager Toolbar Icons

General Buttons	Action
	Refresh —Refreshes the Voltaire Fabric Manager main window with the most updated information.
	Events Log —Displays the online Events Log (Events Table), described on page 3-22. online The Events Log provides information on the events and alarms in the system.
	Back/Forward —Cycles backward and forward through open Fabric Manager windows.
	Up —Moves the view one level up, according to the Subnet Tree hierarchy.
	Topology Map —Launches the Fabric Manager Topology Map. (from the topology map option only). See page 3-10 for more information.

Topology Map Buttons	Action
	Pan Interactor – Allows you to drag and drop the icons in the topology map.
	Select – Allows you to select an object in the Topology Map.
	Zoom in area – Enlarges the objects when centering selected area.
	Zoom in –Enlarges the size of objects displayed in the Topology Map.
	Zoom out –Decreases the size of objects displayed in the Topology Map.
	Fit to Contents –Resizes the Topology Map to fit entirely on the screen, allowing you to see all objects contained in the map.
	Hierarchical Layout – Rearranges the Topology Map to the default arrangement.
	Nodes Information – Displays the Node Information window.

3.4.9 Topology Table View

To display the topology view in textual format:

- Click the *Table* tab at the bottom of the Topology map. The following window is displayed.

The screenshot shows the Voltaire Manager application window. The main area displays a table of network devices. The table has the following columns: State, GUID, Name, IP Address, Description, Vendor ID, Device ID, and Type. The data rows show various hosts and switches, some with alarm states like 'Minor' or 'Critical'. At the bottom of the window, there are two tabs: 'Topology Map' and 'Table'. The 'Table' tab is selected, showing a detailed log of events with columns: Type, Date/Time, Source, and Description. The log entries show critical and minor alarms related to counter thresholds being exceeded.

State	GUID	Name	IP Address	Description	Vendor ID	Device ID	Type
Minor	0008f104004030ff	ISR9XXX	192.168.0.155	ISR 9096	Voltaire	5A0A	Switch
Normal	0001c904003f0008	ibhost-10	172.25.1.21	Hca1_2-1	Mellanox Technologies	0000	CA
Normal	0001c904003f0006	ibhost-9	172.25.3.6	Hca1_1-4	Mellanox Technologies	0000	CA
Critical	0001c904003f000e	ibhost-2	172.25.3.16	Hca1_2-4	Mellanox Technologies	0000	CA
Normal	0001c904003f0004	ibhost-15	172.48.1.18	Hca1_1-3	Mellanox Technologies	0000	CA
Normal	0001c904003f000c	ibhost-12	172.25.15.54	Hca1_2-3	Mellanox Technologies	0000	CA
Normal	0001c904003f0002	ibhost-5	172.25.2.1	Hca1_1-2	Mellanox Technologies	0000	CA
Normal	0001c904003f000a	ibhost-11	172.25.3.1	Hca1_2-2	Mellanox Technologies	0000	CA
Normal	0001c904003f0000	ibhost-14	172.54.3.65	Hca1_1-1	Mellanox Technologies	0000	CA
Normal	0001c904003f0018	ibhost-1	192.168.0.1	Hca1_4-1	Mellanox Technologies	0000	CA
Normal	0001c904003f0016	ibhost-16	152.54.13.16	Hca1_3-4	Mellanox Technologies	0000	CA
Normal	0001c904003f001e	ibhost-6	172.25.12.1	Hca1_4-4	Mellanox Technologies	0000	CA
Normal	0001c904003f0014	ibhost-3	172.25.1.16	Hca1_3-3	Mellanox Technologies	0000	CA
Warning	0001c904003f001c	ibhost-7	172.25.2.8	Hca1_4-3	Mellanox Technologies	0000	CA
Normal	0001c904003f0012	ibhost-8	172.25.7.19	Hca1_3-2	Mellanox Technologies	0000	CA
Normal	0001c904003f001a	ibhost-4	172.25.2.10	Hca1_4-2	Mellanox Technologies	0000	CA
Normal	0001c904003f0010	ibhost-13	172.32.13.1	Hca1_3-1	Mellanox Technologies	0000	CA

Type	Date/Time	Source	Description
Critical	Mon Jun 20 11:06:05 IDT 2005	ibhost-2 / HCA 1	Counter threshold was exceeded. New value is 22222, previous value was 11111
Minor	Mon Jun 20 11:02:48 IDT 2005	ISR9XXX / sLB-24 1 / Internal Port 10	Counter threshold was exceeded. New value is 22222, previous value was 11111

Figure 3-7. Topology Table View

Table 3-7 describes the parameters displayed in the Topology table view.

Field	Description
State	Indicates the alarm state of the node/host. The alarm state can be one of the following: <i>Normal</i> , <i>Minor</i> , <i>Warning</i> or <i>Critical</i> .
GUID	The GUID of the node/host.
Name	The user-assigned name of the node/host.
IP Address	The IP address of the node/host.
Description	A description of the type of node/host.

Field	Description
Vendor ID	The ID/name of the vendor that manufactures the node/host.
Device ID	An ID of the node/host.
Type	Another identifier of the node/host type.

Table 3-7. Topology Table View Fields

Sorting the Topology Table View

You can sort the data in the Topology Table View by clicking the column headers. An arrow indicates the sort order (ascending or descending). Use Ctrl-click for a secondary sort order.

Filtering the Table View

You can filter the Topology Table to only display nodes with a certain alarm state. By default the table view shows all nodes regardless of alarm state (All box is checked). Check one or more boxes.

3.5 Managing Alarms and Events

The Fabric Manager provides advanced alarm and event reporting capabilities. This section describes some of these capabilities.

3.5.1 The Current Alarms Window

The Current Alarms window displays the alarms present in the fabric. It is used to perform a fabric diagnostic. Refer to Chapter 6. Fabric Diagnostic , Section 6.3.3 for further information.

To display the Current Alarm window:

- Select *Fabric/Current Alarms* from the Main Menu.

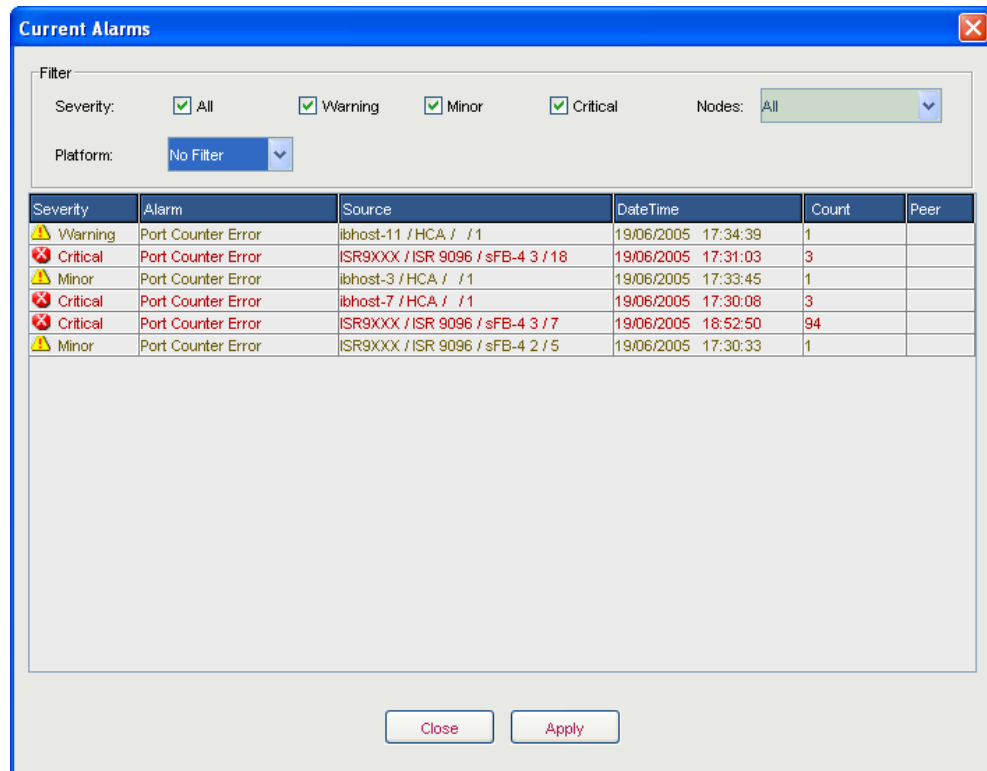


Figure 3-8. Current Alarms

Filtering the Current Alarms

You can filter the Current Alarms to display all alarm states or only specific Alarm States. By default the table view shows all nodes regardless of alarm state (All box is checked). Check one or more boxes.

Viewing Alarm Information

You can filter and view Switch, Host, HCA, or RLX alarm information by selecting the preferred option from the Platform drop-down Menu.

Table 3-8 describes the parameters displayed in the Current Alarms window.

Parameter	Description
Severity	Displays the alarm severity, which can be one of the following: <i>Critical</i> , <i>Minor</i> or <i>Warning</i> .
Alarm	Displays a textual description of the event/alarm type.
Source	Displays the object where the event originated.
Date/Time	The date and time at which the alarm occurred.
Count	How many times an event mapped to this alarm was received since the last clear.
Peer	Displays the information of the remote port of the link or node with which the event is associated

Table 3-8. Current Alarm Window Fields

To find out more specific details pertaining to an event, right click the event listing in the Event Log and select *Alarm Data*. The following of window is displayed.

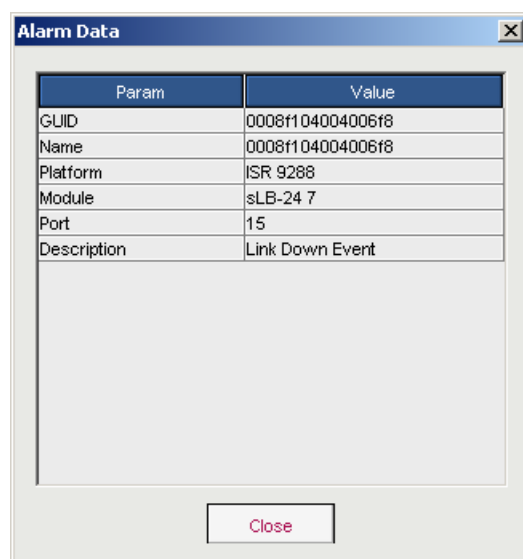


Figure 3-9. Alarm Data

This window displays the following additional data:

Parameter	Description
GUID	Displays the Global Unique Identification number (GUID) of the alarmed device/port.
Name	Displays the name of the alarmed object.
Platform	The switch platform in which the alarmed object is installed.
Module	The module/board type where the alarm occurred.
Port	The alarmed port number.
Description	A textual description of the alarm.

Table 3-9. Alarm Data Window Fields

Alarms types are detailed in the Current Alarm Table, in Appendix C, on page C-3.

Clearing Alarms

Clearing an alarm means that you have taken the steps to correct the problem and now wish to remove the event from the Current Alarm list.

- To clear a specific alarm, right click the event listing in the Current Alarms window and select *Clear Alarm*.
- To clear all the alarms displayed in the Current Alarms window, right click the alarm listing in the Current Alarms window and select *Clear All*.

NOTE



After clearing an alarm in the Fabric Manager, if the actual alarm still persists physically, the alarm will reappear in the Current Alarms window.

3.5.2 The Trap Table and Event Logs

The Trap Table is displayed at the bottom of the main window. It provides information on the events and alarms in the system.

The Trap Table is available in both, the VFM and the CLI.

Refer to page 6-13 for a list of the reported events.

Type	Date/Time	Source	Description
Normal	Mon Sep 06 17:10:01 GMT+02:00 2004	172.25.3.210	SM INFO: Get Subnet Port Counters Completed
Normal	Mon Sep 06 17:10:01 GMT+02:00 2004	172.25.3.210	PORT COUNTERS ERROR: at 0008f1 04004004bf LID 13: Port GUID 0008f1 04004004bf port#6: Symbol E
Normal	Mon Sep 06 17:10:01 GMT+02:00 2004	172.25.3.210	SM INFO: Get Subnet Port Counters
Normal	Mon Sep 06 17:07:01 GMT+02:00 2004	172.25.3.210	SM INFO: Get Subnet Port Counters Completed
Normal	Mon Sep 06 17:07:01 GMT+02:00 2004	172.25.3.210	PORT COUNTERS ERROR: at 0008f1 04004004bf LID 13: Port GUID 0008f1 04004004bf port#6: Symbol E
Normal	Mon Sep 06 17:07:01 GMT+02:00 2004	172.25.3.210	SM INFO: Get Subnet Port Counters

Figure 3-10. Trap Table

NOTE



The Trap Table only displays the events that occur when the Fabric Manager session is current. Events that occur when the Fabric Manager session is not active are not displayed in the Trap Table.

To display a complete list of events, use the Events Log feature described on page 6-13.

For each event/alarm, the Trap Table displays the following information.

Event Information	Description
Type	Displays the severity of the event/alarm, which can be one of the following: <i>Normal</i> , <i>Warning</i> , <i>Minor</i> , and <i>Critical</i> .
Date/Time	Displays the date and time of the event/alarm occurrence. Note —events originating in the fabric, from a node or host, are time-stamped with the date/time of the node or host clock, which could differ from the PC time. Events originating in the PC are time-stamped with the PC clock time.
Source	Displays the IP address of the source of the event/alarm.
Description	Displays a short description of the event/alarm.
Category	Displays the source of the event. Possible values are: SA – for events that occurred in the Subnet Administration SM – for events that occurred in the Subnet Manager Port – for events related to port activity.

Event Information	Description
EventId	Displays a system generated ID number that identifies the event. Refer to Appendix C for a list of the events reported in the system.

Table 3-10. Trap Table Data**Rearranging the Trap Table**

You can rearrange columns positions within the Trap Table by dragging and dropping a selected column in the new desired position.

Event Logs

The SM log, topology log (fabric, subnet management routing log information), and Linux log (system log – shows info of the OS) are available via the CLI as well as via a HyperTerminal/Minicom.

Logs can be retrieved by the means of a browser by entering their IP address or via a terminal.

Viewing Logs in a Browser

You can view error and event logs from a browser by entering the IP address and errorlog.txt or eventlog.txt as shown in the following example:

<http://172.25.3.16/errorlog.txt>

Sorting Logs

You can sort the data in the Trap Table View by clicking the column headers. An arrow indicates the sort order (ascending or descending). Use Ctrl-click for a secondary sort order.)

Getting More Data for an Event

To find out more specific details pertaining to an event* (see note)

- Right-Click the event listing in the Trap Table. The following menu is displayed.

NOTE



This feature is only supported for certain events; when a specific type of event does not support this feature, the *View Event* option is grayed out in the menu.

Sun Jun 19 18:53:50 IDT 2005	ISR9XXX / sFB-4 3 / 7	Counter threshold was exceeded. New
Sun Jun 19 18:53:49 IDT 2005	ISR9XXX / sFB-4	Counter threshold was exceeded. New
Sun Jun 19 18:53:48 IDT 2005	ISR9XXX / sFB-4	Counter threshold was exceeded. New
Sun Jun 19 18:53:47 IDT 2005	ISR9XXX / sFB-4	Counter threshold was exceeded. New
Sun Jun 19 18:53:46 IDT 2005	ISR9XXX / sFB-4	Counter threshold was exceeded. New
Sun Jun 19 18:53:45 IDT 2005	ISR9XXX / sFB-4	Counter threshold was exceeded. New
Sun Jun 19 18:53:43 IDT 2005	ISR9YYY / sFB-4 3 / 7	Counter threshold was exceeded. New

View Event...
Go To Node...
Clear Event
Clear All

Figure 3-11. Events Log Right-click Menu

- Select *View Event*. The following window is displayed.

Event Data	
Port Info:	Peer Info:
Node GUID: 0008f104004006f8	Node GUID: 0008f104004006f8
Platform: ISR 9288	Platform: ISR 9288
Module: FCR at sRBD 12	Module: sFB-12 1
Logical Port: Module 1 / Internal 1	Logical Port: 71
Port GUID: 0008f100012b0001	Port GUID: 0008f104004006fb
IB Port: 1	IB Port: 23
LID: 44	LID: 28
Close	

Figure 3-12. Events Data

The window displays further data on the event, for both sides of the link. The Port Info (left-hand) pane lists data for the local port with which the event is associated; the Peer info (right-hand) pane lists data for the remote port of the link or node with which the event is associated.

Parameter	Description
Node GUID	Displays the Global Unique Identification number (GUID) of the device.
Platform	The switch platform in which the port is installed.
Module	The module/board type in which the port is installed.
Logical Port	Additional information, if applicable, regarding the location of the port.
Port GUID	Displays the Global Unique Identification number (GUID) of the port.
IB Port	Displays the IB port number.
LID	Displays the port LID.

Table 3-11. Events Data Fields

- Select *Go to Node*. The node with which the event is associated is displayed on the right panel.

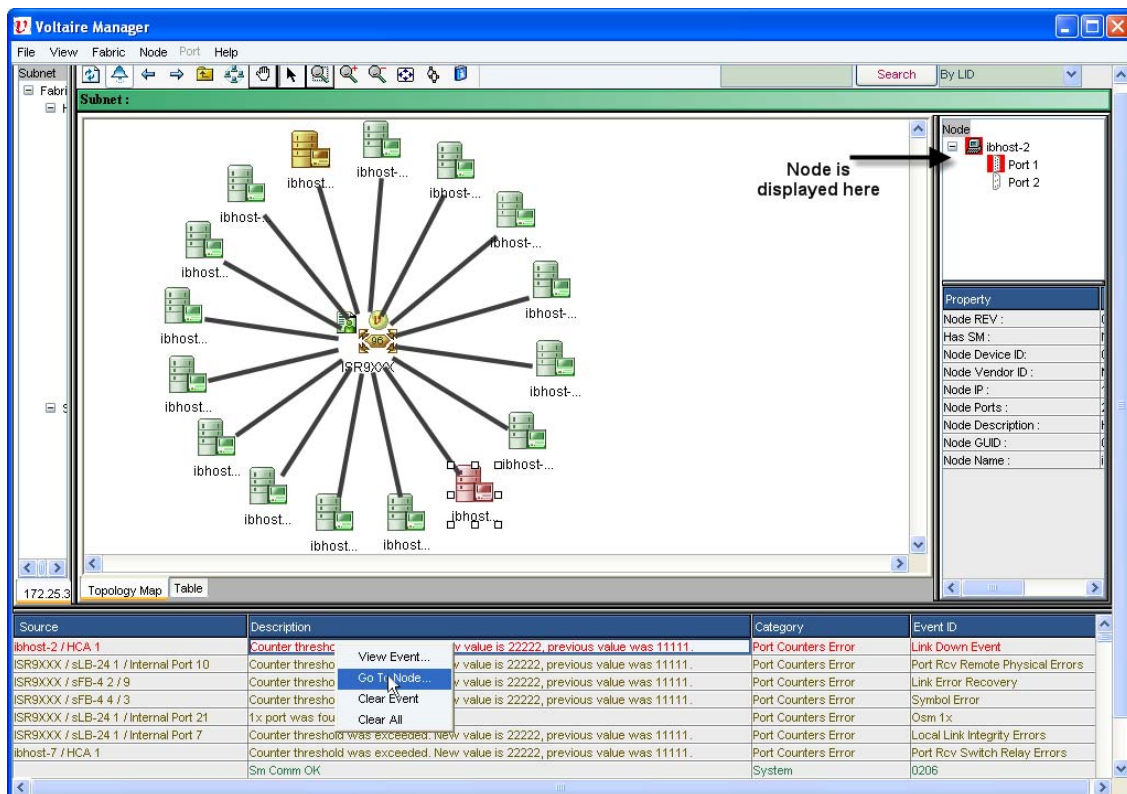


Figure 3-13. Go to Node

Clearing Events

Clearing an event means that you have taken the steps to correct the problem and now wish to remove the event from the Trap Table.

To clear a specific event:

- Right click the event listing in the Trap Table and select *Clear Event*.

To clear all the events displayed in the Trap Table:

- Right click the event listing in the Trap Table and select *Clear All*.

Setting Event Filters

By applying event filters, you can limit the types of events that are reported in the Fabric Manager Trap Table.

To display and set the event filters:

- Select *Fabric/Fabric Inspect/Settings* from the main menu. The following dialog box is displayed.

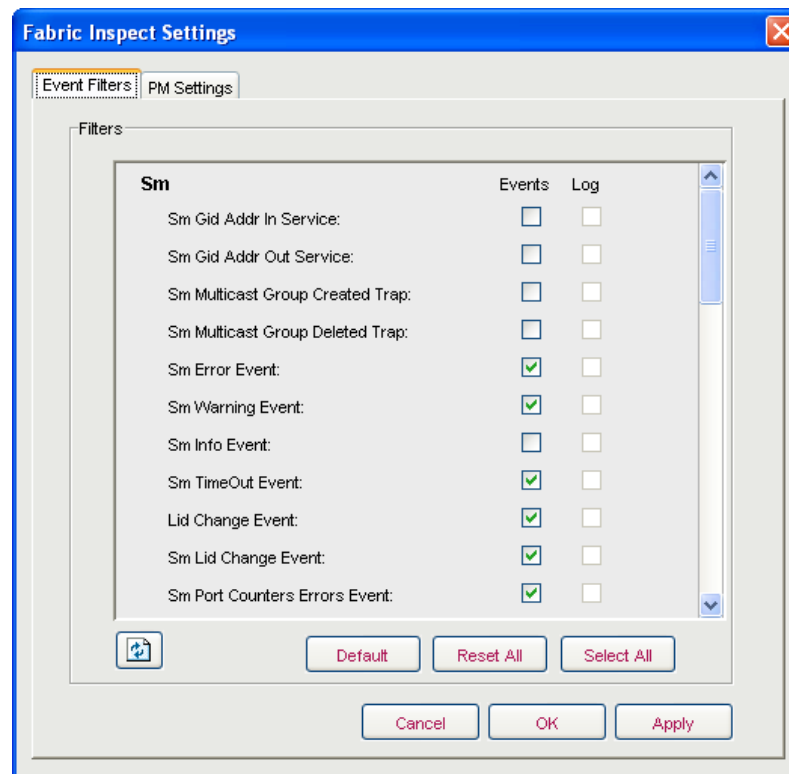


Figure 3-14. Event Filters Settings

By default, all events are reported.

- Uncheck an event to filter it.
- Click **Default** to return to the default settings.
- Click **Reset All** to deselect all events.
- Click **Select All** to select all events.
- Click **Apply** to save any changes made in the dialog box.
- Click  to return to the previously saved settings.

To display and set the PM Settings

- Step 1** Select *Fabric/Fabric Inspect/Settings* from the VFM main menu. The following dialog box is displayed.

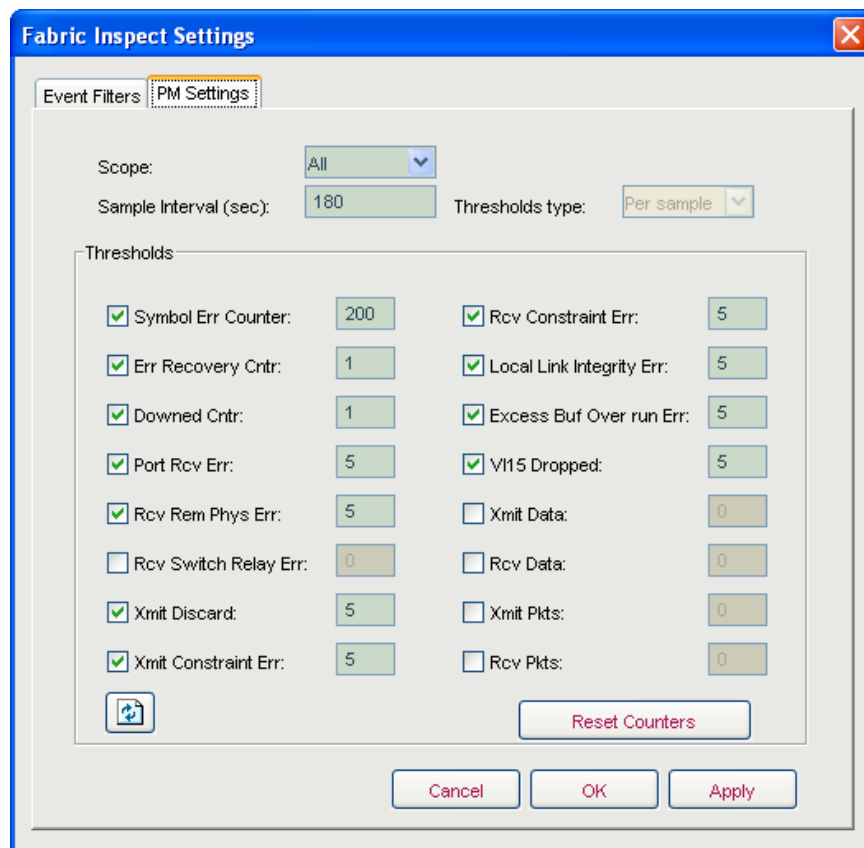


Figure 3-15. PM Settings

By default, PM counters are monitored for all devices in the fabric (Scope field is set to All).

To change these settings, select one of the following values from the Scope field:

- Hosts Only—PM data is only collected for HCAs in the fabric
- Switches only—PM data is only collected for switches in the fabric

You can also disable selected PM counters by unchecking the box displayed next to the counter.

- Step 2** In the *Sample Interval* field, set the frequency at which the PM data is collected from the counters; range: 60 seconds to 65535 seconds.

NOTE

The *Thresholds Type* in the current software release is always set to *Per sample*, i.e. the Fabric Manager checks for errors in each sampling, if the threshold is passed between samples (interval). The counter is reset when it reaches its maximum value as defined in the InfiniBand specification.

- Step 3** Disable the Thresholds you don't want to have checked.
- Step 4** Click **Reset** to reset the PM counters in all fabric devices.
- Step 3** Click **Apply** to save PM configuration.
- Note:** Data entered appear in red until clicking Apply.
- Step 5** Click  to return to the previously saved settings.

Refer to Configuring PM Using the Fabric Manager, Diagnostic Section 6.2.2 for further information on PM Settings.

3.6 Viewing Properties Data

The Node/Host/Link Properties pane of the main window displays various configuration data relevant to the object selected in the topology map or in the Node/Host/Link Information pane. This includes the following information:

- Node Properties
- Port Properties
- Link Properties

3.6.1 Node Properties

The following information is displayed when selecting a node (host or switch) in the main window.

Property	Value
Node REV :	000000A0
Has SM :	Active SM
Node Device ID:	5A07
Node Vendor ID :	Voltaire
Node IP :	
Node Ports :	216
Node Description :	ISR 9288
Node GUID :	0x0008f104:004006f8
Node Name :	0008f104004006f8

Figure 3-16. Node Properties

Table 3-12 describes the parameters displayed for the node.

Parameter	Description
Node Rev	Displays the hardware version of the device.
Has SM	Displays whether or not a Subnet Manager is installed in the node.
Node Device ID	Displays the identification number of the device.
Node Vendor ID	Displays the name of the vendor that manufactured the device.
Node IP	Displays the IP address of the node.

Parameter	Description
Node Ports	Displays the total number of ports in the node.
Node Description	Displays the node type and model.
Node GUID	Displays the Global Unique Identification number (GUID) of the device.
Node Name	Displays the user-assigned name of the node.

Table 3-12. Host - Node Information Parameters

3.6.2 Port Properties

The following information is displayed when selecting a port in the Node/Host Information pane.

Property	Value
Port GUID :	0008f10403960905
Port Number	1
Link State :	ACT
SM LID	1
Port LID	42
MTU :	2048
Num VLS :	VL0-VL7
HQLife :	13
LMC	0
Gid Prefix	fe800000:00000000
MKEY	0000000000000000
Has SM	No SM
Port State :	Active
Port Physical State :	Link Up
Active Link Width :	4x
Max Supported Link Width :	1x Or 4x
Active Link Speed :	2.5Gbps
Max Supported Link Speed :	2.5Gbps

Figure 3-17. Port Properties

Table 3-13 describes the parameters displayed for each port.

Parameter	Description
Port GUID	Displays the Global Unique Identification number (GUID) of the port.
Port Number	Displays the port number, according to the numbering scheme of the switch/line board.
Link State	Displays the link state, which can be <i>Active</i> or <i>Not Active</i> .
SM LID	Displays the Local ID of the Subnet Manager.
Port LID	Displays the Local ID of the port.
MTU	Displays the Maximum Transmission Unit value of the port.
Num VL's	Displays the VLs supported by the port. Current support is for VLs 0 to 7.
HQLife	Displays the Head of Queue Life setting for the port.
LMC	Defines the LID Mask Control value of the port. Possible values are 0 to 7.
GID Prefix	The GID is a concatenation of a 64-bit subnet prefix (an identifier of the subnet), and a manufacturer-assigned, globally unique ID.
MKey	Displays the Management Key Value of the port. Used by an advanced SM mechanism that authorizes subnet management operations based on the Mkey. Default value: 0 (no authentication).
Has SM	Indicates if a Subnet Manager is present in the node.
Port State	Displays the current state of the port, which can be one of the following: <i>Active</i> , <i>Initialize</i> or <i>Down</i> .
Port Physical State	Displays the current state of the physical link.
Active Link Width	Displays the current link width: 1X or 4X.
Max Supported Link Width	Displays the maximum link width the link can support: 1X or 4X
Active Link Speed	Displays the current signaling rate of the link: current default is 2.5 Gb/s.
Max Supported Link Speed	Displays the maximum signaling rate the link can support: current default is 2.5 Gb/s.

Table 3-13. Port General Information Parameters

3.6.3 Link Properties

The following information is displayed when selecting a link (connecting line between hosts/switches) in the main window topology map

Property	Value
Number of Connections:	2
1 Link width:	4x
2 Link width:	4x

Figure 3-18. Link Properties

Table 3-14 describes the parameters displayed for each line.

Parameter	Description
Number of Connections	Displays the number of connections between devices; a link with more than one connection is depicted as a thick line on the topology map.
Link Width	Displays the connection width; in the present software release this field always displays 4x to indicate InfiniBand 4X.

Table 3-14. Link Information Parameters

3.7 Information Views

The Voltaire Fabric Manager allows you to get an overall view of the InfiniBand fabric, and to drill down to specific information views all the way down to the individual port. At each view different information is displayed.

3.7.1 List of Hosts

To display a list of the hosts in the fabric, click on the Host icon in the subnet tree. The following window is displayed.

LAVISM : Fabric , Hosts/Adapter nodes						Last Update: Wed Feb 16 16:18:45 2005
GUID	Name	IP Address	Ports	Node Description	Vendor	Device ID
0008f104039608b0	0008f104039608b0		2	Voltaire HCA400	Voltaire	5A04
0008f104039608904	omni10.voltaire.com	192.168.60.10	2	Voltaire HCA400	Voltaire	5A04
0008f10403965224	kip21.voltaire.com	192.168.60.21	2	Voltaire HCA400	Voltaire	5A44
0008f10403965028	omni4.voltaire.com	192.168.60.4	2	Voltaire HCA400	Voltaire	5A04
0008f10403965020	omni1.voltaire.com	192.168.60.1	2	Voltaire HCA400	Voltaire	5A04
0008f10403965014	momo	192.168.60.6	2	Voltaire HCA400	Voltaire	5A04
0008f10403965010	omni5.voltaire.com	192.168.60.5	2	Voltaire HCA400	Voltaire	5A04
0008f10403965008	momo	192.168.60.3	2	Voltaire HCA400	Voltaire	5A04
0008f10403962e24	kip23.voltaire.com	192.168.60.23	2	Voltaire HCA400	Voltaire	5A04
0008f10403962754	kip22.voltaire.com	192.168.60.22	2	Voltaire HCA400	Voltaire	5A04
0008f10403962740	kip24.voltaire.com	192.168.60.24	2	Voltaire HCA400	Voltaire	5A04
0008f10403961114	0008f10403961114		2	Voltaire HCA400	Voltaire	5A04
0008f104039610e0	0008f104039610e0		2	Voltaire HCA400	Voltaire	5A04
0008f104039610d8	0008f104039610d8		2	Voltaire HCA400	Voltaire	5A04
0008f104039610c8	0008f104039610c8		2	Voltaire HCA400	Voltaire	5A04
0008f104039610a0	0008f104039610a0		2	Voltaire HCA400	Voltaire	5A04
0008f10403960fb0	0008f10403960fb0		2	Voltaire HCA400	Voltaire	5A04
0008f10403960f48	0008f10403960f48		2	Voltaire HCA400	Voltaire	5A04
0008f10403960f34	0008f10403960f34		2	Voltaire HCA400	Voltaire	5A04
0008f10403960e50	0008f10403960e50		2	Voltaire HCA400	Voltaire	5A04
0008f10403960904	omni11.voltaire.com	192.168.60.11	2	Voltaire HCA400	Voltaire	5A04
0008f104039608d8	omni13.voltaire.com	192.168.60.13	2	Voltaire HCA400	Voltaire	5A04
0008f104039608a4	omni15.voltaire.com	192.168.60.15	2	Voltaire HCA400	Voltaire	5A04
0008f1040396087c	0008f1040396087c		2	Voltaire HCA400	Voltaire	5A04
0008f10403960878	omni16.voltaire.com	192.168.60.16	2	Voltaire HCA400	Voltaire	5A04
0008f1040396086c	omni9.voltaire.com	192.168.60.9	2	Voltaire HCA400	Voltaire	5A04
0008f10403960860	omni14.voltaire.com	192.168.60.14	2	Voltaire HCA400	Voltaire	5A04

Figure 3-19. Hosts List

Parameter	Description
GUID	Displays the Global Unique Identification number (GUID) of the device.
Name	Displays the user-assigned device name. The device name is either set by the ATS mechanism, or can be set manually via the CLI or the Voltaire Device Manager.
IP Address	Displays the IP address of the device.
Ports	Displays the total number of ports contained in the device.
Node Description	Displays the user-defined description given to the device.

Parameter	Description
Vendor	Displays the vendor name.
Device ID	Displays the device vendor ID.

Table 3-15. Hosts List Information Parameters

3.7.2 Host Information

To drill down to a specific host and view the list of ports and associated information, either double click on the host in the Host List, or select the host in the main window subnet tree. The following window is displayed.

LAVISM : Fabric , Hosts/Adapter nodes , omni10.voltaire.com						
Port	State	LID	Width	Speed	MTU	VLs
1	Active	54	1x	2.5Gbps	2048 bytes	VL0 - VL7
2	Down	0	--	--	--	--

Figure 3-20. Hosts Ports

Parameter	Description
Port	Displays the port number, according to the numbering scheme of the switch host.
State	Displays the state of the port, which can be one of the following: ACT (port is active), DWN (down). This field is color coded to indicate the state of the port.
LID	Displays the Local ID of the port.
Width	Displays the current link width: 1X or 4X.
Speed	Displays the current signaling rate of the link: current default is 2.5 Gb/s.
MTU	Displays the Maximum Transmission Unit value of the port.
VLs	Displays the VLs supported by the port. Current support is for VLs 0 to 7.

Table 3-16. Host Ports Information Parameters

3.7.3 Switches List

To display a list of the switches in the fabric, click on the Switch icon in the subnet tree. The following window is displayed.

LAVISM : Fabric , Switches							
GUID	Name	LID	IP Address	Ports	Node Description	Vendor	Device ID
0008f104004006f8	0008f104004006f8			216	ISR 9288	Voltaire	5A07
0008f1040041065e	ISR-9024	37	169.25.2.3	24	ISR9024 Voltaire	Voltaire	5A06

Figure 3-21. Switches List

Option	Description
GUID	Displays the Global Unique Identification number (GUID) of the switch.
Name	Displays the user-assigned switch name. The switch name is either set by the ATS mechanism, or can be set manually via the CLI or the Voltaire Switch Manager.
LID	Displays the Local ID of the switch.
IP Address	Displays the IP address of the switch.
Ports	Displays the total number of ports contained in the switch.
Node Description	Displays the name of the switch.
Vendor	Displays the vendor name.
Switch ID	Displays the switch vendor ID.

Table 3-17. Switches List Information Parameters

3.7.4 Switch/Line Board Information

Double click on a switch or a Line Board to drill down to that switch view.

LAVISM : Fabric , Switches , 0008f104004006B , sLB 3						
Port	State	LID	Width	Speed	MTU	VLs
1	Down	0	--	--	--	--
2	Down	0	--	--	--	--
3	Down	0	--	--	--	--
4	Down	0	--	--	--	--
5	Down	0	--	--	--	--
6	Down	0	--	--	--	--
7	Active	11	4x	2.5Gbps	2048 bytes	VL0 - VL7
8	Down	0	--	--	--	--
9	Down	0	--	--	--	--
10	Down	0	--	--	--	--
11	Down	0	--	--	--	--
12	Down	0	--	--	--	--
13	Down	0	--	--	--	--
14	Down	0	--	--	--	--
15	Down	0	--	--	--	--
16	Active	10	4x	2.5Gbps	2048 bytes	VL0 - VL7
17	Down	0	--	--	--	--
18	Down	0	--	--	--	--
19	Down	0	--	--	--	--
20	Down	0	--	--	--	--
21	Down	0	--	--	--	--
22	Active	11	4x	2.5Gbps	2048 bytes	VL0 - VL7
23	Down	0	--	--	--	--
24	Down	0	--	--	--	--

Figure 3-22. Switch/SLB Information

Option	Description
Port	Displays the port number, according to the numbering scheme of the switch or line board.
State	Displays the state of the port, which can be one of the following: ACT (port is active), DWN (down). This field is color coded to indicate the state of the port.
LID	Displays the LID of the port.
Width	Displays the active width of the link: 1X or 4X.
Speed	Displays the signaling rate of the link: 2.5 Gb/s or 5 Gb/s (for future use).
MTU	Displays the Maximum Transmission Unit for the link.
VLs	Displays the number of Virtual Lanes enabled on the link.

Table 3-18. Switch/SLB Information Parameters

3.7.5 Port Information

To drill down and view information for a specific port

- Double click a port in the Node/Host section in the Topology map. You can also arrive at this window by selecting *Port—Port Info* from the main menu; this option is only active when a port is selected.

The screenshot shows a 'Port Info' dialog box with a blue title bar and a close button (X) in the top right corner. The dialog contains several fields with labels and values:

- Port GUID: 0008f10403965029
- GID Prefix: fe800000:00000000
- Port LID: 238
- Port State: Active
- LMC: 1
- Physical: Link Up
- SM LID: 2
- Link Width: 4x
- Speed: 2.5Gbps
- Port MTU: 2048
- VL's: VL0-VL7
- Has SM: No SM
- MKey: 0000000000000000

A 'Cancel' button is located at the bottom center of the dialog.

Figure 3-23. Port Information

Parameter	Description
Port GUID	Displays the Global Unique ID of the port. The GUID is a unique, 128-bit number that identifies the port.
GID Prefix	The GID is a concatenation of a 64-bit subnet prefix (an identifier of the subnet), and a manufacturer-assigned, globally unique ID.
Port LID	Displays the Local ID of the port.
Port State	Displays the state of the port, which can be one of the following: ACT (port is active), DWN (down). This field is color coded to indicate the state of the port.
LMC	Defines the LID Mask Control value of the port. Possible values are 0 to 7.

Parameter	Description
Physical	Displays the current state of the physical link.
SM LID	Displays the Local ID of the Subnet Manager.
Link Width	Displays the active width of the link: 1X or 4X.
Speed	Displays the speed of the port.
Port MTU	Displays the Maximum Transmission Unit value of the port.
VLs	Displays the VLs enabled on the port.
Has SM	Indicates if a Subnet Manager is present in the node.
MKey	Displays the Management Key Value of the port.

Table 3-19. Port Information Parameters

3.7.6 Link Information

To drill down to a specific link and view related information:

- Select the link/connection in the main window topology map. The following window is displayed in the main window.

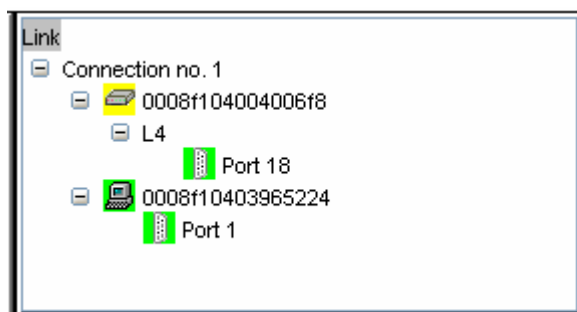


Figure 3-24. Link Information

This window displays information regarding the ports at both end of the link. This includes the alarm status, color-coded according to the standard convention described on page 3-8, of the ports, the switch that the port belongs to and (if applicable) the board which the port belongs to.

3.7.7 Grouping Information

Boards are grouped into a single icon, as shown in the example below.



This icon is an example representing a chassis regrouping all its components.

The grouping information window allows you to view the information of the various modules in the chassis.

To display grouping information:

- Select the switch in the main window topology view and selecting *Node/Grouping Info* from the Main Menu. The following is an example of the window displayed.

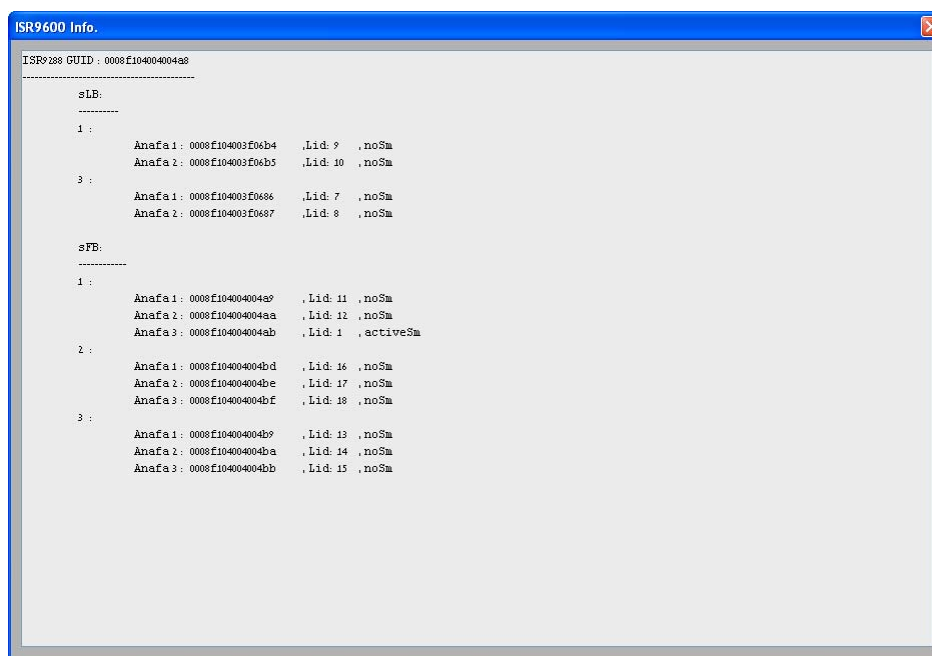


Figure 3-25. Grouping Information

NOTE

Grouping is not supported in this version for the sLB-8-12.



3.8 Configuring Nodes

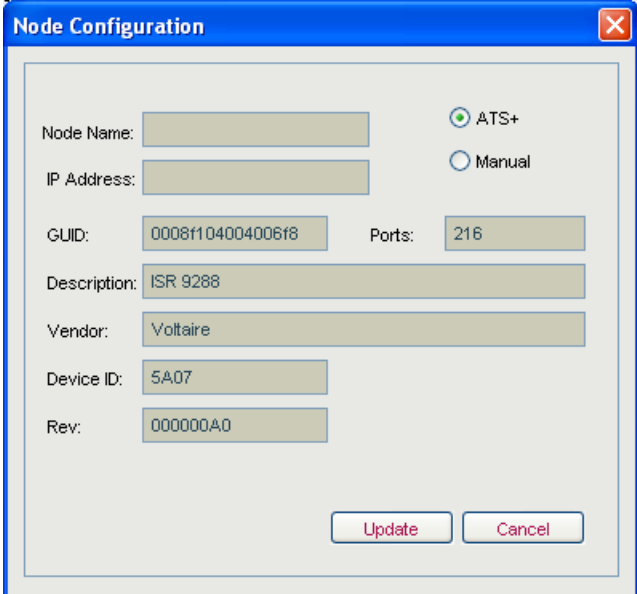
To view and set the configuration of a host or switch, use one of the following menu options:

- Select the node in the topology map and select *Node—Configuration* from the main menu.

OR

- Right click the node in the topology map and select *Configuration* from the context sensitive menu.

The following window is displayed.

A screenshot of a 'Node Configuration' dialog box. The dialog has a blue title bar with the text 'Node Configuration' and a close button. Inside, there are several input fields and radio buttons. The 'Node Name' field is empty. The 'IP Address' field is empty. The 'GUID' field contains '0008f104004006f8'. The 'Ports' field contains '216'. The 'Description' field contains 'ISR 9288'. The 'Vendor' field contains 'Voltaire'. The 'Device ID' field contains '5A07'. The 'Rev' field contains '000000A0'. There are two radio buttons: 'ATS+' (selected) and 'Manual'. At the bottom right, there are 'Update' and 'Cancel' buttons.

Node Configuration

Node Name:

IP Address:

GUID: Ports:

Description:

Vendor:

Device ID:

Rev:

☒ ATS+ ☐ Manual

Figure 3-26. Node Configuration

Parameter	Description
ATS/Manual	By default, the ATS option is selected, meaning that node data is discovered and input to the node repository by means of the Automatic Translation Service (ATS) mechanism. However, if ATS is not supported you can click the <i>Manual</i> option and enter node data manually.
Node Name	If you selected the <i>Manual</i> option, enter a user-assigned name for the node. This is the name that appears in the various Device Manager and Fabric Manager windows in reference to the node.
IP Address	If you selected the <i>Manual</i> option, you can enter the IP address of a switch; you can not enter the IP address for hosts. For all hosts and nodes that are set to be discovered using the ATS mechanism, this field is read-only.
GUID	Displays the Global Unique Identification number (GUID) of the node.
Ports	Displays the number of ports on the node.
Description	Displays a description of the node.
Vendor	Displays the vendor that manufactures the device.
Device ID	Displays the device ID.
Rev	Displays the revision number of the node, if applicable.

Table 3-20. Node Configuration Parameters

3.9 Configuring the Subnet Manager

This section describes viewing and configuring SM parameters via the Voltaire Fabric Manager.

To view Subnet Manager general parameters:

-
- Step 1** Select *Fabric/SM Properties* from the main menu. The following information is displayed:

The image shows a Windows-style dialog box titled "SM Properties". It contains several configuration fields arranged in two columns. The fields and their values are: Port GUID (0008f1040040060b), LMC (0-7) (0), SM KEY (0000000000000000), Sweep Interval (seconds) (10-1000) (15), Activity Count (43655), Verbosity Mode (Verbose), Priority (0-15) (10), MADs Pipeline (16), State (master), Polling Retries (3-30) (12), SM Mode (Enable), and Contact (empty). At the bottom, there are three buttons: OK, Cancel, and Apply.

Parameter	Value
Port GUID	0008f1040040060b
SM KEY	0000000000000000
Activity Count	43655
Priority (0-15)	10
State	master
SM Mode	Enable
Location	
LMC (0-7)	0
Sweep Interval (seconds) (10-1000)	15
Verbosity Mode	Verbose
MADs Pipeline	16
Polling Retries (3-30)	12
Contact	

Figure 3-27. SM Details

The parameters displayed in the SM Properties window are described in Table 3-21.

Parameter	Description
Port GUID	Read-only field that displays the GUID of the port where the SM resides.
SM-KEY	Read-only field that displays the Key of the Subnet Manager (SM).
Activity Count	Read-only field that displays the activity count of the Subnet Manager (SM). The Activity Counter is incremented each time the SM issues an SMP (Simple Management Protocol) or performs other management activities. It is used as a heartbeat indicator by standby SMs.
Priority	Sets the priority of the Subnet Manager (the higher the number the higher the priority). When there are two Subnet Managers in the network, the one that has the higher priority will be the Master Subnet Manager. In the event of a failure on the Master, a standby Subnet Manager (one with a lower priority) will take over.
SM State	Read-only field that displays the current SM state. Possible values are: <i>Standby</i> and <i>Master</i> .

Parameter	Description
SM Enable	Defines the SM functionality mode. Possible values are <i>Enable</i> or <i>Disable</i> .
LMC	Defines the LID Mask Control value for the SM. Possible values are 0 to 7.
Sweep Interval (seconds)	Defines the sweep interval for the SM. Possible values are 10 to 1000. 0 indicates that the sweep interval is disabled.
Verbosity Mode	Defines the verbosity mode of the SM log file. Possible values are: Error, Info, Verbose, Debug, Funcs or Frames.
MADs PIPELINE	Read-only field that displays the SM Send window, that is, the maximum number of outstanding MADs on the wire. 16 is the default value for switch platforms ISR 9096, ISR 9288 and ISR 9024.
Polling Retries	Defines the polling retries interval for a standby SM to poll the master SM for its activity. If the activity is not incremented within that number of polling retries, the standby SM deduces that master SM has failed. Possible values are 1 to 1000.

Table 3-21. SM Parameters

The configuration of Subnet Parameters can also be performed via the CLI. Refer to Subnet Manager Menu, on page A-47 for more information.

3.10 Fabric Inspect

Fabric Inspect is used for diagnostics purposes and is fully detailed and illustrated in the Fabric Diagnostic Chapter, on page 6-1.

3.11 Cluster Monitor

Use the Cluster Monitor dialog box to set the path of the Ganglia Monitoring tool.

- Step 1** Select *Fabric/Cluster Config* from the main menu. The Cluster Monitor dialog box is displayed:



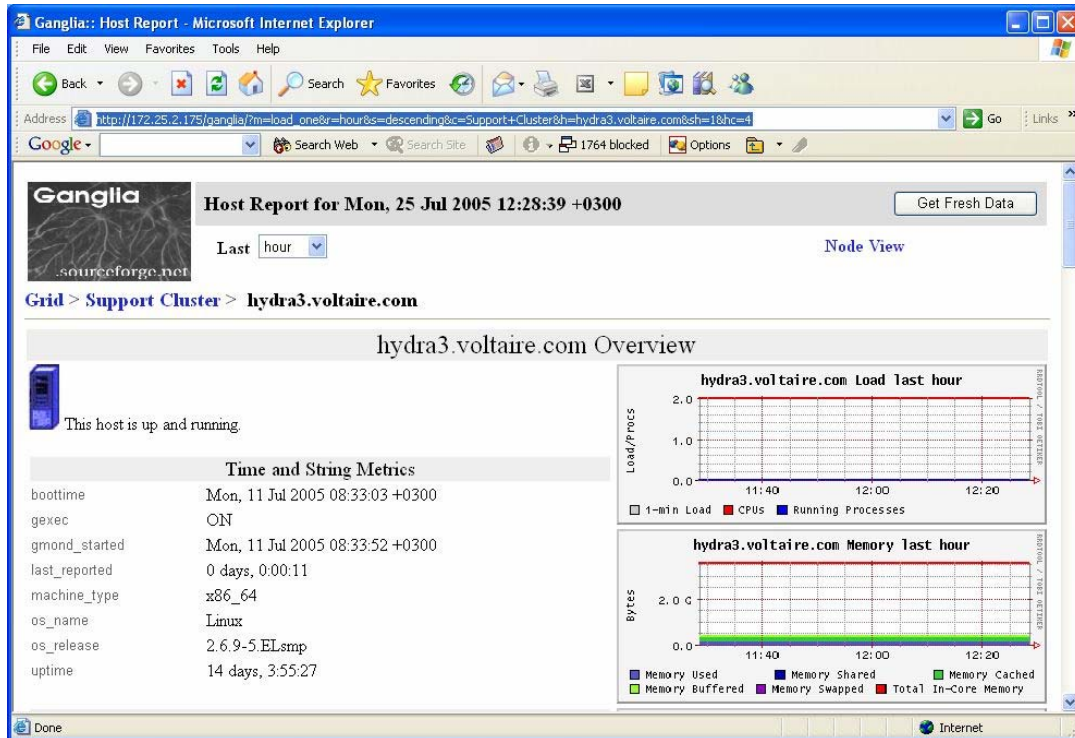
Figure 3-28. Cluster Monitor Dialog Box

- Step 2** Enter the string as follows:
1. Cluster Head Node IP Address
 2. Ganglia tool
 3. Cluster Name
 4. Name of the Host
- Step 3** Click Update and close the window.
- Step 4** On the topology map, right-click the host and select Monitor. The browser window opens with the Ganglia link directed to the specific host, displaying a detailed host report, as shown in the example below.

Example:

[http://172.25.2.175/ganglia/?m=load_one&r=hour&s=descending&c=Support+Cluster&h=\\$HOST&sh=1&hc=4](http://172.25.2.175/ganglia/?m=load_one&r=hour&s=descending&c=Support+Cluster&h=$HOST&sh=1&hc=4)

In the example below, the Host is called hydra3.voltaire.com



3.12 Configuring Quality of Service (QoS)

3.12.1 General

InfiniBand was specifically designed to support QoS functionality. To do this, InfiniBand employs Virtual Lanes (VL), which are separate logical communication links sharing a single physical link. Each link can support up to 15 standard VLs and one management lane (VL 15).

Two mechanisms using Service Levels (SLs) and VLs are provided to implement Quality of Service (QoS)-related services. One is SL-to-VL mapping, the other is data VL arbitration. Both are described in detail below.

Virtual lanes (VLs) provide a means to implement multiple logical flows over a single physical link. Link level flow control can be applied to one lane without affecting the others.

There are two types of VLs, one for normal traffic called a data VL and one reserved for subnet management traffic. The subnet management traffic VL is VL15. All other VLs are for normal traffic.

Service Level (SL) is an indication of the service class of the packet. SLs provide differentiated services, improving fabric utilization and avoiding deadlock.

To avoid having the user configure each port in the subnet with all the QoS parameters, templates have been defined, and their configuration is sufficient for the configuration of the whole subnet. When configuring a subnet port, the QoS parameters are derived from the templates according to the number of VLs supported by the port.

3.12.2 SL to VL Mapping

As a packet traverses the subnet, its service level (SL) defines the desired QoS level. Because each link along a path can implement a different number of VLs, each switch port has an SL-to-VL mapping table that is set by the Subnet Manager to implement the appropriate packet priority with the actual number of VLs.

An InfiniBand link can have one of the following VL configurations:

Number of Data VLs Supported	VL Numbering
1	VL0
2	VL0, VL1
4	VL0 - VL3
8	VL0 - VL7
15	VL0 - VL14

There are two types of VLs, one for normal traffic called a data VL and one reserved for subnet management traffic. The subnet management traffic VL is VL15. All other VLs are for normal traffic.

To set the SL to VL mapping:

- Step 1** Select the switch to configure in the topology map of the Fabric Manager main window
- Step 2** Select Fabric—Quality of Service from the main menu. The following dialog box is displayed.

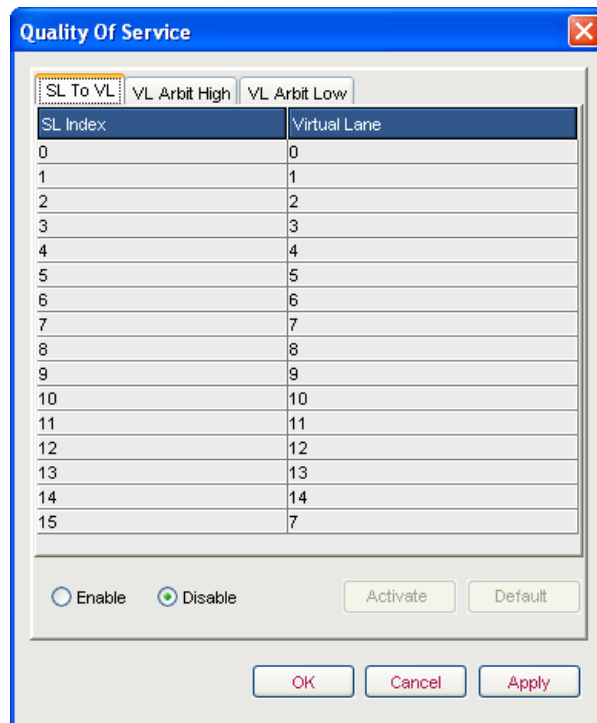


Figure 3-29. QoS SL to VL Mapping Table

This dialog box is used to set the SL to VL mapping.

- Step 3** Click **Disable** and the Subnet Manager will not configure the QoS parameters (default firmware settings will apply).
- Step 4** To change the SL to VL mapping, position the cursor in the *Virtual lane* column and click the mouse button.
- Step 5** Select the new value and click **Apply** to save the setting. Repeat as required.
- Step 6** Click **Activate** to send the new settings to the switch.

3.12.3 QoS Arbitration

VL arbitration refers to the arbitration done for an outgoing link on a switch, router or channel adapter. Each output port has a separate arbiter. VL arbitration is controlled by the following three components: *High-Priority*, *Low-Priority* and *Limit of High-Priority*. The *High-Priority* and *Low-Priority* components are each a list of VL/Weight pairs.

Each list entry shall contain a VL number (values from 0-14), and a weighting value (values 0-255), indicating the number of 64 byte units that may be transmitted from that VL when its turn in the arbitration occurs.

The *Limit of High-Priority* component indicates the amount of high-priority packets that can be transmitted without an opportunity to send a low priority packet. The *High-Priority* table consists of VL/Weight pairs that deserve high bandwidth respectively to those in the *Low-Priority* table. As long as there are packets to transmit from the *High-Priority* table this transmission will occur, regardless of any waiting packets in the *Low-Priority* table, unless the *Limit of High-Priority* is reached. This limit ensures that the *Low-Priority* table items are not starved. Within each table, the transmission is done with respect to the weight given to each VL.

Setting QoS Arbitration

- Step 1** Select the switch to configure in the Fabric manager main window, and select *Fabric-Quality of Service* from the main menu.
- Step 2** Click the VL Arbit High tab, or the VL Arbit Low tab (the procedure is identical for both). The following dialog box is displayed.

Quality Of Service

SL To VL | **VL Arbit High** | VL Arbit Low

High Priority Limit: 0

Index	Virtual Lane	Priority weight
0	0	4
1	1	0
2	2	0
3	3	0
4	4	0
5	5	0
6	6	0
7	7	0

☒ Enable ☐ Disable

Quality Of Service

SL To VL | VL Arbit High | **VL Arbit Low**

Index	Virtual Lane	Priority weight
0	0	0
1	1	4
2	2	4
3	3	4
4	4	4
5	5	4
6	6	4
7	7	4

☒ Enable ☐ Disable

Figure 3-30. QoS VL High Arbitration Table

- Step 3** In the *High Priority Limit* field, enter the number of high-priority data that can be transmitted without an opportunity to send low priority data. Specifically, the number of bytes that can be sent is *High Priority Limit* times 4K bytes, with the counting done to 4 byte increments. A High-Priority packet can be sent if current byte count has not exceeded the *High Priority Limit*. A value of 255 indicates that the byte limit is unbounded. (Note: if the 255 value is used, forward progress of low priority packets is not guaranteed by this arbitration scheme.) A value of 0 indicates that only a single packet from the high-priority table may be sent before an opportunity is given to the low-priority table.

The *High-Priority* list has a minimum length of one and a maximum of length of 64. The *Low-Priority* list has a minimum length equal to the number of data VLs supported and a maximum of length of 64. The *High-Priority* and *Low-Priority* component lists are allowed to be of different length.

Each list entry contains (1) a VL number (values from 0-14), and (2) a weighting value (values 0-255), indicating the number of 64 byte units which may be transmitted from that VL when its turn in the arbitration occurs. The PktLen field in the LRH is used to determine the number of units in the packet. (Note, the VCRC and also the symbols between packets introduced by the physical layer should not be included in VL arbitration weight calculations.) The calculation is

maintained to 4 byte increments.

- Step 4** Click **Activate** to set the changes in the fabric.
- Step 5** Click **Apply** to save the configuration in the Fabric manager.
- Step 6** Click **Default** to display the default settings in the dialog box.

Quality of Service can also be configured via the CLI. Refer to the CLI QoS Menu, on page A-61 for further detail.

3.13 Configuring Routing Algorithms

The Voltaire Fabric Manager supports the following routing algorithms:

- Balanced-routing
- Rearrangeable routing (multi-path with sFB consistency)

3.13.1 Balanced Routing Scheme

This is the default routing scheme and is applicable to all Fabric configurations. InfiniBand routing is done in the following manner: each InfiniBand switch maintains a simple forwarding database that defines, per destination LID, which physical port should be used for outgoing packets. The forwarding databases are configured by the Subnet Manager when the subnet is initially configured and upon network changes.

In the event that multiple paths exist between a pair of nodes in the subnet, the Subnet Manager identifies multiple minimal paths among those end-ports, selects one path and programs the fabric accordingly. However, to better utilize network bandwidth, the Subnet Manager balances its selections such that the traffic between all end-ports is balanced over all possible paths in the fabric.

3.13.2 InfiniBand Multi-PathScheme

InfiniBand supports multi-path routing in the following manner: each end-port can have several LID addresses, beginning at the base LID, and continuing to the base-lid + $2^{\text{LMC}} - 1$. The SM can be configured for LMC (LID Mask Control) values between 0 and 7. If the LMC is not zero, the SM assigns a LID range for every end-port and configures the switches' forwarding tables accordingly. The switches themselves are not aware of LID ranges and the multi-LID addressing scheme is transparent to them.

Voltaire balanced-routing scheme supports multi-path routing in that manner. Furthermore, in case multiple paths exist between a pair of nodes in the subnet, it balances the assignment of the LID range among the possible paths.

3.13.3 Multi-Path Scheme with SFB Consistency

This routing scheme is applicable for Clos topologies. It provides a consistent matching between a LID within an end-node LID range, and a sFB of the Clos fabric.

Once activated, this routing algorithm will reconfigure the fabric in the following manner:

Given an end-node base-lid and LMC value, that end-node is assigned with lid range:

baselid ,.. , base-lid + $2^{LMC}-1$.

Define:

lid(i) = base-lid+i

SFB(i) = sFB in location `i` in the sFB table

The algorithm programs the fabric in a way such that the path to lid(i) passes through sFB(i) – this is the sFB consistency rule.

NOTE



If the algorithm cannot complete due to configuration errors (e.g., user error in sFB GUIDs) then the fabric manager programs the fabric using the default routing scheme.

Indications for such configuration errors and fallback to the default routing scheme are currently available via the SM log file only.

To configure routing via the Fabric Manager:

- Step 1** Select Fabric/Routing Configuration from the main menu. The following dialog box is displayed.

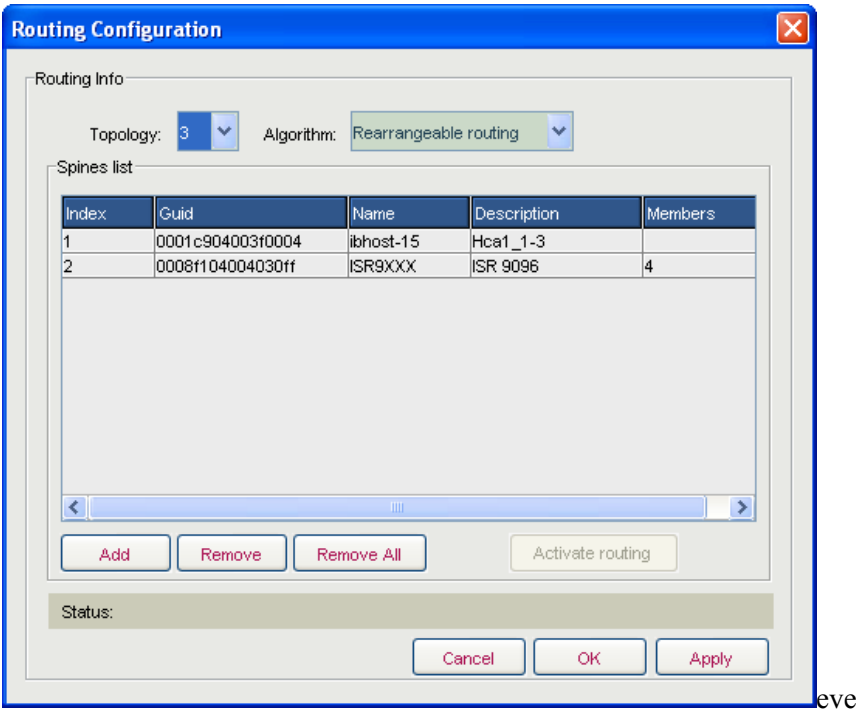


Figure 3-31. Routing

- Step 2** Add sFBs to the SFB List using one of the following options:
- In the main window topology map, right click the node to add and select *Mark SFB* from the context sensitive menu.
 - Click **Add** in the Routing dialog box. The following dialog box is displayed.

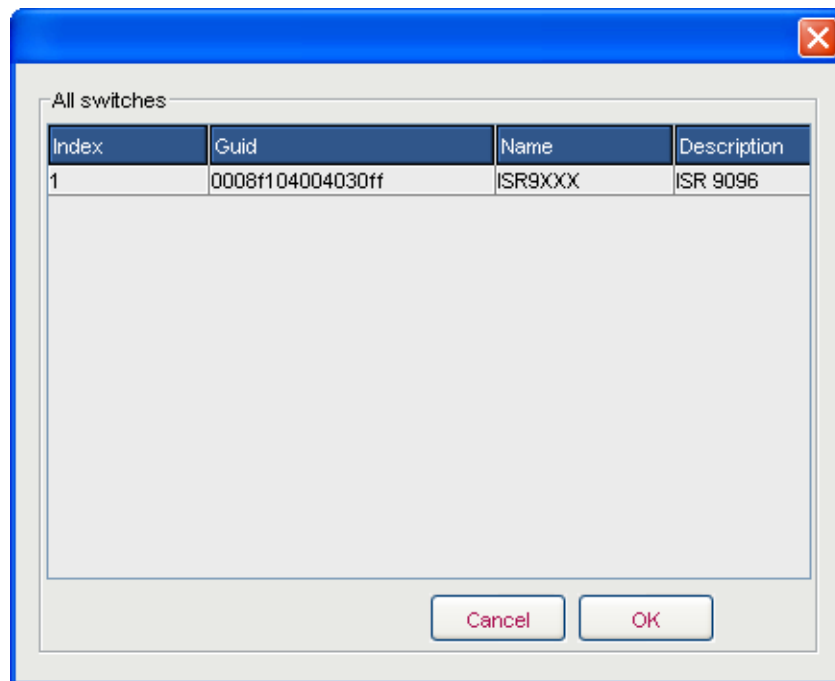


Figure 3-32. Add to SFB List

- Click **OK** to add selected sFB and close the dialog box.
- Step 3** Select the routing topology from the *Topology* drop-down menu.
- Step 4** If you selected the Rearrangeable algorithm (the Multi-Path with sFB consistency algorithm described previously on page 3-54), then select a value from the Topology field.
- Step 5** Click **Activate**.
- Step 6** Click **Apply**

Chapter 4. Voltaire Device Manager (VDM)

In This Chapter

This chapter provides information about working with the Voltaire Device Manager (VDM) application. This includes information on the following topics:

- Device Manager Description, on page 4-1
- Getting Started with the Device Manager, on page 4-2
- The Device Manager Main Window, on page 4-6
- Voltaire Device Manager Operating Conventions, on page 4-15
- Viewing Switch Information, on page 4-16
- Viewing Module Information, on page 4-26
- Using the Voltaire Device Manager for Switch Management, on page 4-38

4.1 Device Manager Description

The Voltaire Device Manager (VDM) is an embedded application with a web-based GUI that provides InfiniBand management functionality for Voltaire ISR 9096 and ISR 9288 and ISR 9024 switches. It enables users to view a graphical representation of the modules, its LEDs and ports, and to monitor and configure device parameters.

NOTE



Common ISR 9096/9288 VDM features are graphically illustrated using either the ISR 9096 **OR** the ISR 9288 representation.

4.2 Getting Started with the Device Manager

To start the application:

- Step 1** Set the Fast Ethernet IP address using the CLI through a serial console connection, as described on page 2-6.
- Step 2** Open the Internet Browser and connect to the fast Ethernet IP address (for example: <http://192.168.1.2>). The Voltaire Device Manager Initiate window is displayed.

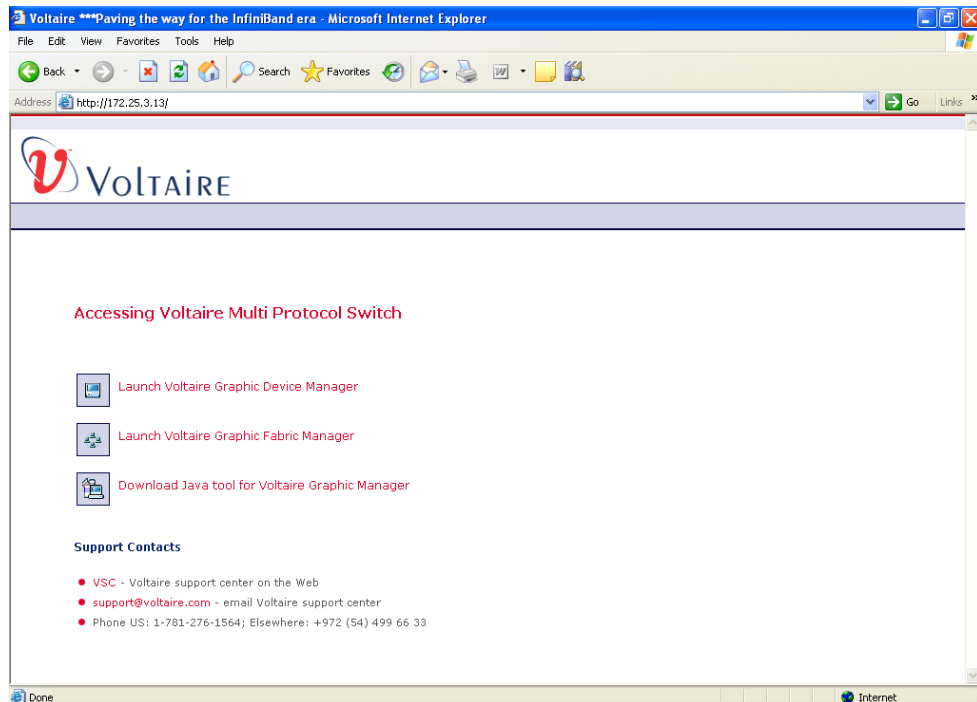


Figure 4-1. Accessing Voltaire Multi Protocol Switch Window

The window called Accessing Voltaire Multi Protocol Switch contains the following icons:

Icon	Description
	Launches the Voltaire Graphic Device Manager.
	Launches the Voltaire Fabric Manager which is described in <i>Chapter 4</i> .
	Click to download the Sun Java Web Start application, which must be installed in order to use the Voltaire Vision GUI.

Table 4-1. Voltaire Initiate Icons

NOTE

When opening the Voltaire Device Manager Initiate window for the first time, click



to start the Sun Java Web Start installation. The computer that is being used must be connected to the Internet for successful Java Web Start package download from Sun's website.

Step 3

To start the Voltaire Device Manager application, click  from the Voltaire Device Manager Initiate Window.

4.2.1 Login to the Device Manager

After the Voltaire Device Manager application is started, the Login window is displayed as shown in Figure 4-2.

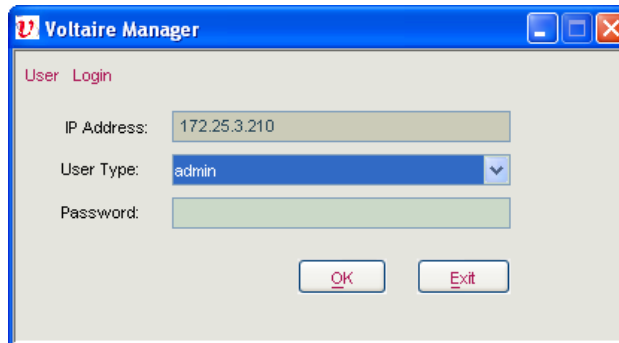


Figure 4-2. Login window

Field	Description
IP Address	The IP address of the switch is displayed in the read-only IP Address field.
User type	The Voltaire Device Manager supports three types of users, each with a different authorization level. - Administrator user type. This user can perform all configuration and provisioning operations. Default password: 123456 - Manager user type. Enables you to set the parameters. Default password: voltaire - Guest user type. This user can only view device configuration and status information. Default password: voltaire
Password	The passwords for each type of user can be defined in the Users window, described on page 4-42.

Table 4-2. Login Window - Fields Description

To Login into the Device Manager:

- Step 1** Select the *User Type*.
- Step 2** Type in the *Password* and click **OK**. The Voltaire Device Manager Main window is displayed, as shown in Figure 4-4 and Figure 4-5.

NOTE

Login password is case sensitive.

4.2.2 Terminating the Voltaire Device Manager

You terminate the Voltaire Device Manager by performing an Exit operation. The exit operation shuts down the Voltaire Device Manager application; event logging continues to work even after the GUI is shut down.

To terminate the Voltaire Device Manager:

- Step 1** Select *File/Exit* from the main menu. The following warning message is displayed:

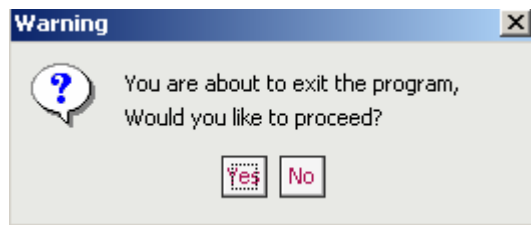


Figure 4-3. Exit Warning Message

- Step 2** Click **Yes** to confirm.

4.3 The Device Manager Main Window

This section describes the Main window of the ISR 9096, ISR 9288, and the ISR 9024 Voltaire Device Manager application, including basic functions and operations.

The Main window provides access to all Voltaire Device Manager functions. It also provides a graphical representation of the connected switch and components, with color-coded visual indicators that display alarms and important events in the switch.

NOTE



The Main window, and especially the device graphical representation, differs depending on the switch connected to the Device Manager.

4.3.1 ISR 9288 Main Window

Figure 4-4 shows the ISR 9288 Main window:

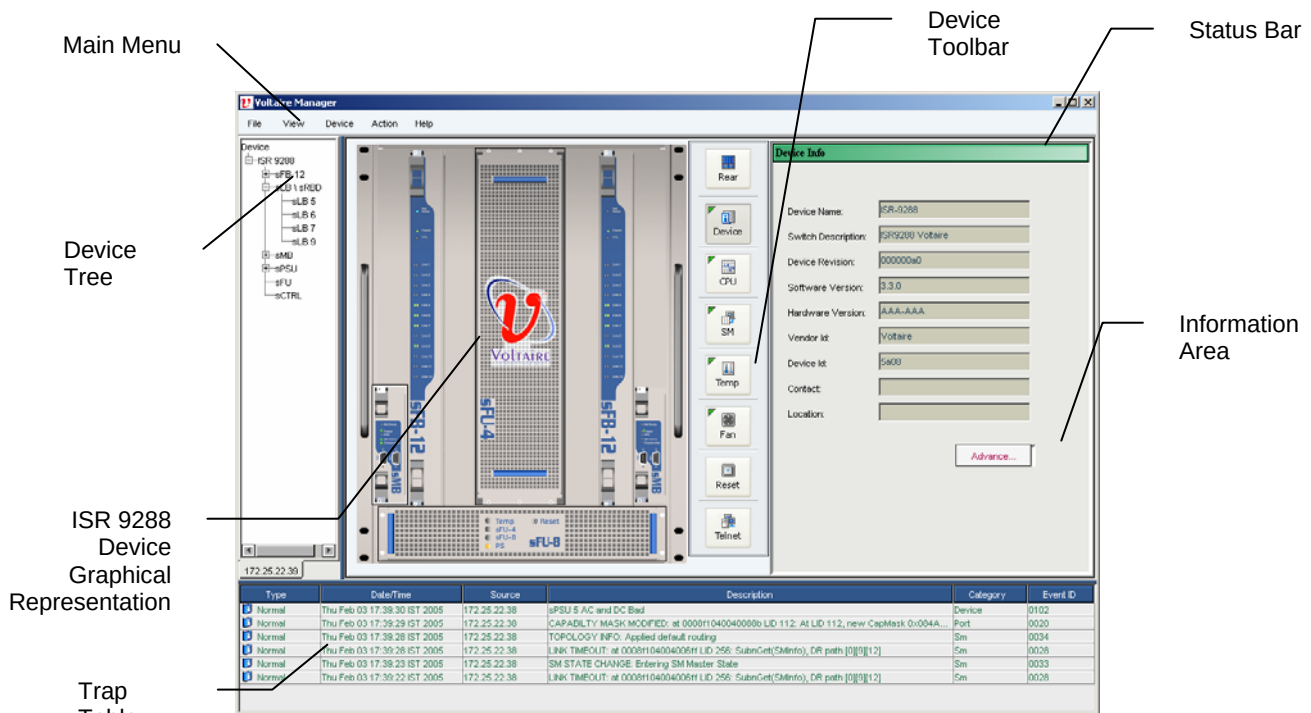


Figure 4-4. ISR 9288 Voltaire Device Manager Main Window

4.3.2 ISR 9096 Main Window

Figure 4-5 shows the ISR 9096 Main window:

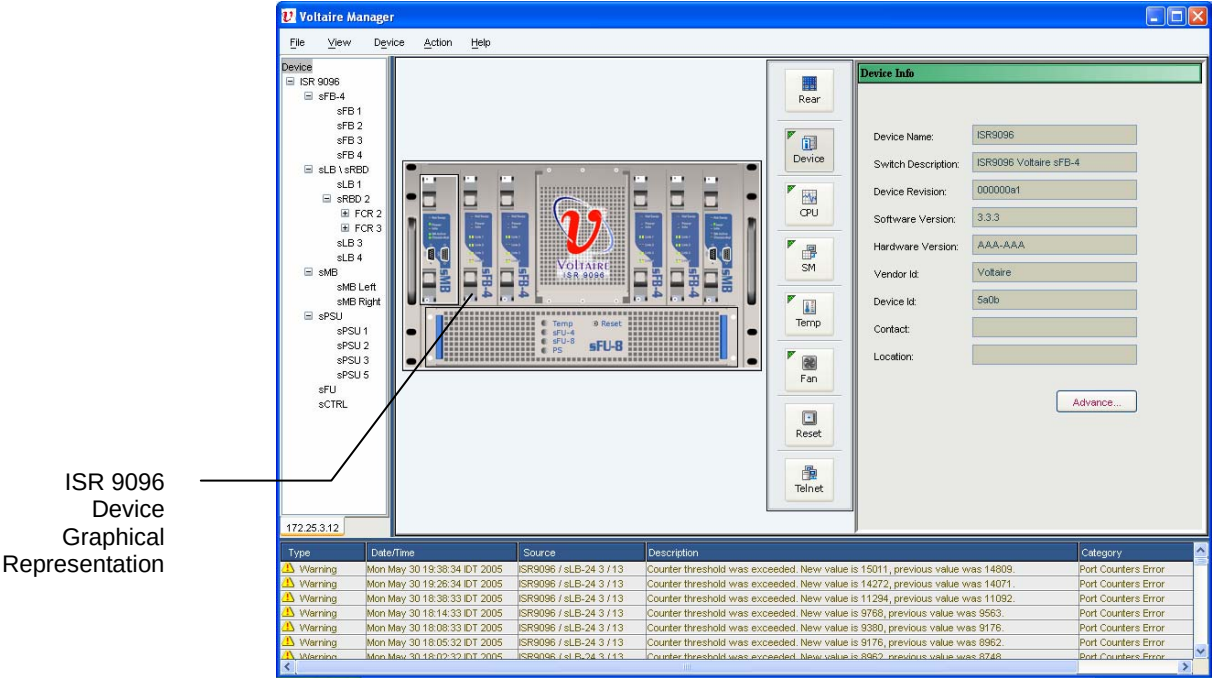


Figure 4-5. ISR 9096 Voltair Device Manager Main Window

Main Menu

The main menu provides access to the following Voltaire Device Manager functions:

Menu	Submenu Action
File	Exit —Logs out of the Voltaire Device Manager and terminate all Voltaire Device Manager processes.
View	View Tree —Shows/hides the device tree. View Events — Shows/hides the Events Log.
Device	IP Setting —Shows the Fast Ethernet IP and routing mode settings. Remote Management Settings —Displays and sets the SNMP Manager's IP addresses and general remote management setting details. Users —Configures user authorization passwords. Config FTP —Sets the FTP Server parameters. Advanced - Future Launch Fabric Manager —Starts a Fabric Manager session. Refer to Chapter 3 of this manual for further information regarding the Fabric Manager. Error Log —Open a window that displays the error log. Event Log —Open a window that displays the event log.
Action	Reset —Restarts the CPU.
Help	About —Displays the Voltaire Device Manager software version, and the switch software and hardware versions.

Table 4-3. Main Menu Options

4.3.3 Device Tree

The ISR9288/9096 VDM Device tree displays the objects in the managed device in a hierarchical format. This includes sFB boards, line boards, sMB, sPSU, sFU, sCTRL boards, sRBDs (IO drawers) and installed router modules.

Figure 4-5 shows the Device tree. The ISR 9288 was used here as an example.



Figure 4-6. Device Tree

You can expand/collapse the navigation tree to display the various components of the switch.

You can show/hide the device tree from view by selecting *View/View Tree* from the Main Menu.

4.3.4 Device Toolbar

The Device toolbar provides fast access to device information and to some device actions, such as Reset and Telnet. The buttons and the functions they invoke are described in Table 4-4.

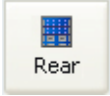
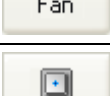
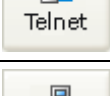
General Buttons	Action
 Front  Rear	Front/Rear —Toggles the device view in the main window, to the front or rear view of the chassis; This does not apply to the ISR 9024.
 Device	Device — Displays device data in the Information Area.
 CPU	CPU — Displays CPU data in the Information Area.
 SM	SM – Displays local SM data in the Information Area.
 Temp	Temp – Displays the temperature readings of the switch components that have an embedded temperature sensor.
 Fan	Fan — Displays information regarding the fan units.
 Reset	Reset —Restarts the CPU.
 Telnet	Telnet — Opens a Telnet window, allowing you to connect to the device through Telnet.
 VFM	VFM — Launches a VFM (Voltaire Fabric Manager) session; see Chapter 3 for a description of the VFM.

Table 4-4. Device Toolbar

Notice the little green triangle at the upper left corner of the Icons. Green means that the status is normal. If a problem exists, it will turn red.

4.3.5 Switch Graphical Representation

The graphical representation of the switch provides a graphical view of the switch panels, its components, its LEDs and ports.

The ISR 9096/9288 Voltaire Device Manager provides two views of this switch, a front view and a rear view. (This does not apply to the ISR 9024)

NOTE



When two Management boards (SMB) are installed in failover configuration, the active SMB board is displayed with a border line around it, as shown in the SMBs at the left of Figure 4-10 and Figure 4-9.

ISR 9096 Switch

Figure 4-7 and Figure 4-8 show the graphical representations of the ISR 9096 switch.

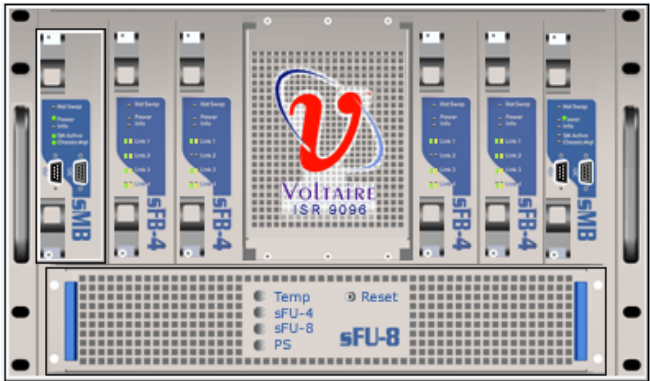


Figure 4-7. ISR 9096 Switch VDM Graphical Representation (Front View)



Click  to display the rear view of the ISR 9096 switch, shown in Figure 4-10.

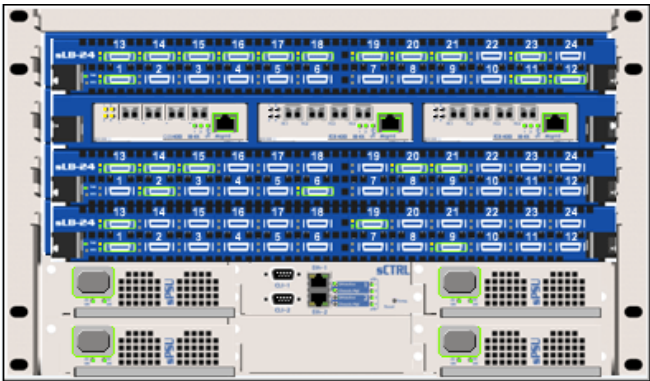


Figure 4-8. ISR 9096 Switch VDM Graphical Representation (Rear View)

ISR 9288 Switch

Figure 4-9 and Figure 4-10 show the graphical representations of the ISR 9288 switch.

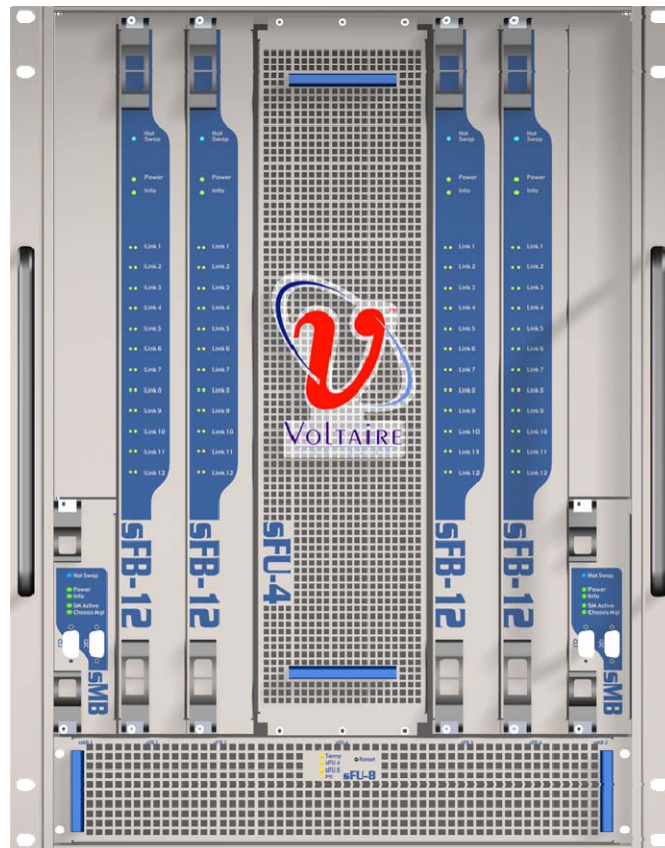


Figure 4-9. ISR 9288 Switch Graphical Representation (Front View)



Click  to display the rear view of the ISR 9288 switch, shown in Figure 4-10.

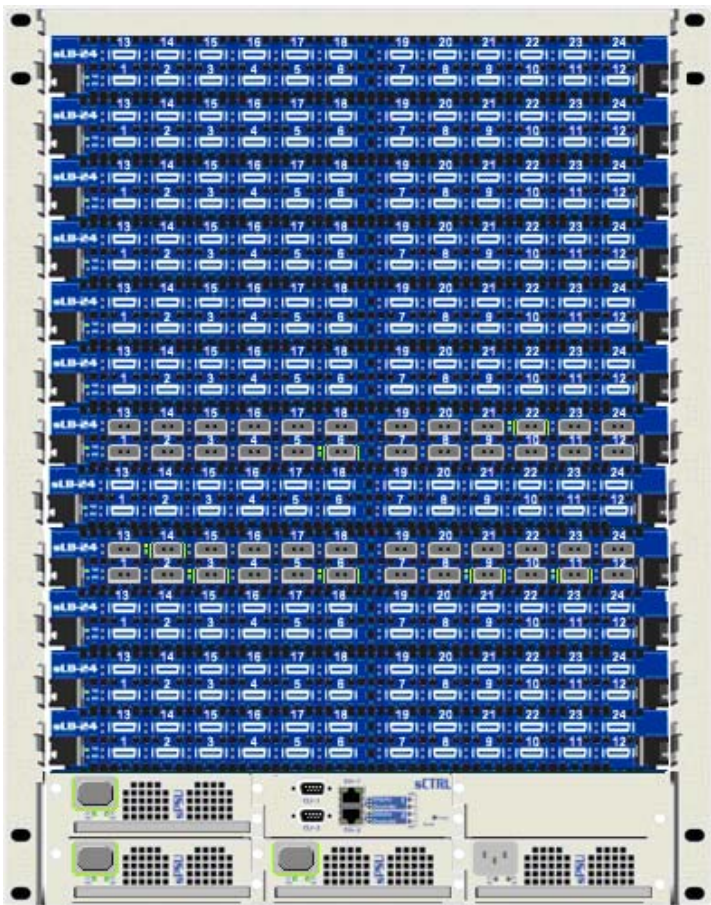


Figure 4-10. ISR 9288 Switch Graphical Representation (Rear View)

ISR 9024 Switch

Figure 4-11 shows the graphical representation of the ISR 9024 switch.

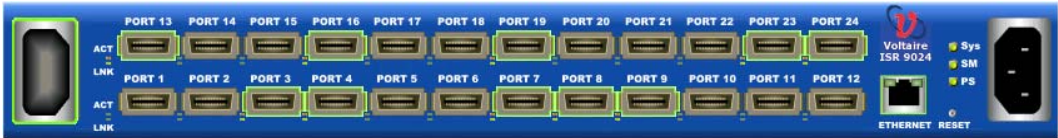


Figure 4-11. ISR 9024 Switch Graphical Representation

4.3.6 Hotspots in Graphical Representation

You can click on various points on the graphical representation to view various details in the Information Area. This includes the following

- IB ports—click on one of these ports to obtain further information on the port operating status; see page 4-17 for information.
- ISR 9024—clicking on any point in the graphical representation, except the ports, displays device general information.
- ISR 9096/9288—clicking on boards in the graphical representation zooms in on the board and displays information windows on the board. Right-clicking allows to zoom in or reset boards.

4.3.7 The Information Area

The Information Area is a read-only area that displays various information, based on user selection in the main and advanced windows.

When the Device Manager is connected to ISR 9096/9288 switches, the Information area can be used to zoom in on specific boards. Click on a board in the device graphical representation (front or rear panel) to display a zoomed view. Refer to page 4-24 for further information.

4.3.8 Trap Table

You can show or hide the Trap Table from view by selecting *View/View Events* from the Main Menu.

Resizing the Trap Table

You can resize the Online Events Log by positioning the cursor on the top border line of the Events Log. The cursor changes into a double-headed arrow with two lines in between; drag the cursor up or down to increase or decrease the size of the Trap Table area.

Refer to page 6-13 for further information on the various types of events and alarms.

4.4 Voltaire Device Manager Operating Conventions

The following are specific operation conventions that apply to the Voltaire Device Manager.

4.4.1 Sorting Tables

You can sort the data in the Voltaire Device Manager tables by clicking the column headers. An arrow indicates the sort order (ascending or descending). Use Ctrl-click for a secondary sort order.

4.4.2 Changing Table Column Sequence

You can adjust the sequence of table columns by dragging the column header to a new location.

4.4.3 Instructional Tool Tips

You can obtain helpful information Voltaire Device Manager operation by positioning the mouse cursor in various locations in the Voltaire Device Manager. Context sensitive help data is displayed as relevant.

4.5 Viewing Switch Information

This Section describes how to view device information using the Voltaire Device Manager; the information is displayed in the Information area of the Main window. The information described in this section varies according to the selection, as described below:

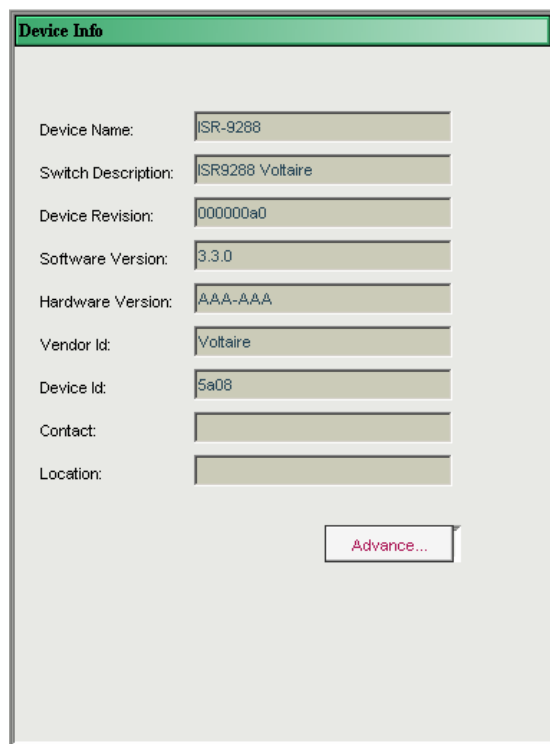
- Device Information, on page 4-16
- Port Information, on page 4-17
- CPU Information, on page 4-20
- Temperature Information, on page 4-22
- Local SM Information, on page 4-22

4.5.1 Device Information

To view device information:

Step 1

On the device toolbar, click  (**Device** icon).
The *Device Info* window (Figure 4-12) opens in the Information area.



Device Info	
Device Name:	ISR-9288
Switch Description:	ISR9288 Voltaire
Device Revision:	000000a0
Software Version:	3.3.0
Hardware Version:	AAA-AAA
Vendor Id:	Voltaire
Device Id:	5a08
Contact:	
Location:	
Advance...	

Figure 4-12. Device Information

Table 4-5 describes the parameters displayed for the device.

Parameter	Description
Device Name	Displays a text description of the switch.
Switch Description	Displays the switch description.
Device Revision	Displays the device revision number.
Software Version	Displays the software version of the switch.
Hardware Version	Displays the hardware version of the switch.
Vendor ID	Displays the vendor identification number.
Device ID	Displays the identification number of the device.
Contact	Displays the user-defined contact person assigned to this device.
Location	Displays the user-defined location assigned to this device.

Table 4-5. Device Information Parameters

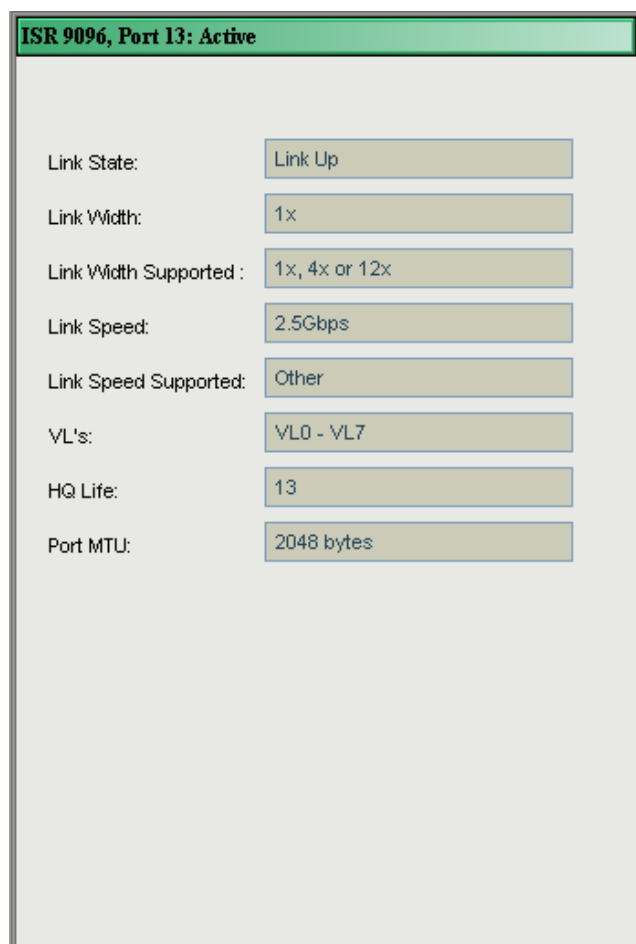
- Step 2** Click advanced to obtain detailed module information (see p.4-24 for further information)

4.5.2 Port Information

To view port information:

- Step 1** In the Main Window Switch graphical representation view, click on a port ().

The following information is displayed in the information area of the main window.



The screenshot shows a window titled "ISR 9096, Port 13: Active". Inside the window, there is a list of port attributes and their values, each displayed in a light blue box. The attributes and values are:

Attribute	Value
Link State:	Link Up
Link Width:	1x
Link Width Supported :	1x, 4x or 12x
Link Speed:	2.5Gbps
Link Speed Supported:	Other
VL's:	VL0 - VL7
HQ Life:	13
Port MTU:	2048 bytes

Figure 4-13. Port Information

Table 4-6 describes the parameters displayed for each port.

Parameter	Description
Physical	Indicates the physical state of the port, which could be one of the following: Polling—port is polling for a link Link Up – Link is active Link Error Recovery—port is attempting to get a link, following a problem such as a short cabled pin.
Link Width	Displays the width (data) of the link.
Link Width Supported	Displays the range of supported width (data) of the link.
Link Speed	Displays the link speed of the port.
Link Speed Supported	Displays the supported link speed of the port.
VL's	Displays the Virtual Lane (VL) range supported by the port.
HQ Life	Displays the Head of Queue lifetime of the port. The port discards a packet from transmission if the Head of Queue life has expired.
Port MTU	Displays the Maximum Transmission Unit value of the port.

Table 4-6. Port Information Parameters

4.5.3 CPU Information

To view CPU information:

Step 1

On the Device toolbar, click  (CPU icon). The following is displayed in the Information Area.

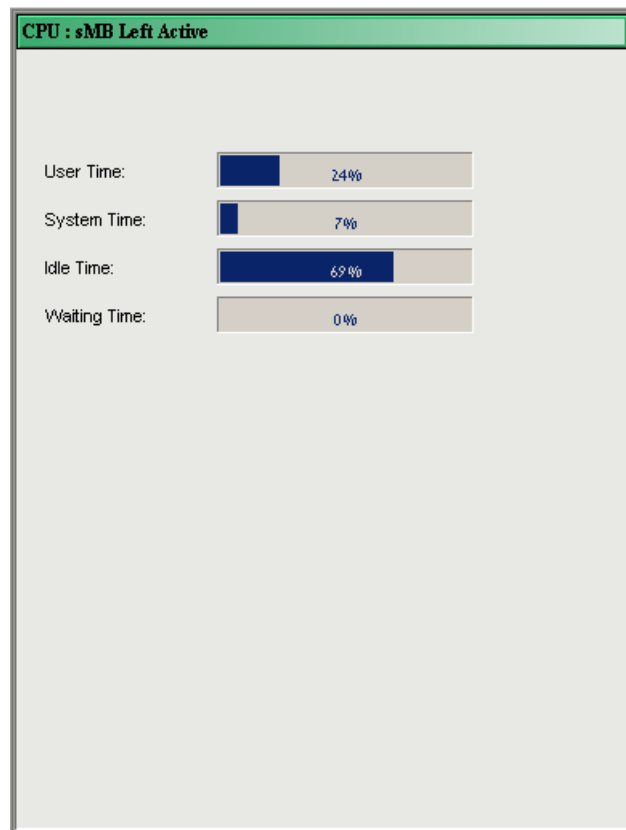


Figure 4-14. CPU Information

For ISR 9096/9288 switches, the status bar displays the relevant sMB card for which the CPU information is displayed; it also indicates whether the sMB card is the active or standby card.

Table 4-7 describes the parameters displayed for the CPU.

Parameter	Description
User Time	The percentage of time (of the total usage time) that the CPU is used.
System Time	The percentage of time (of the total usage time) the system spends using the CPU.
Idle Time	The percentage of time (of the total usage time) the CPU is idle.
Waiting Time	The percentage of time (of the total usage time) the CPU is waiting to process.

Table 4-7. CPU Information Parameters

4.5.4 Temperature Information

To display component temperature readings of a switch that has an embedded temperature sensor:

Step

On the device toolbar, click  (**Temp** icon). The following dialog box is displayed in the main window Information area.

Units Temperatures		
sFB	Farenheit	Celsius
1	114F	46C
2	109F	43C
3	109F	43C
4	120F	49C
sFU	Farenheit	Celsius
sFU8	87F	31C
sFU4	87F	31C
sMB	Farenheit	Celsius
Left	100F	38C
sLB	Farenheit	Celsius
1	107F	42C
2	109F	43C
3	102F	39C
7	104F	40C
8	104F	40C
9	107F	42C
10	102F	39C
11	102F	39C
12	104F	40C

Figure 4-15. Temperature Readings

All fields in this dialog box are read only.

Module temperatures are displayed both in Fahrenheit and in Celsius.

The status bar at the top of the dialog box indicates an overheating alarm condition, should one exist.

When a module heats up (according to preset threshold defaults which can not be adjusted by the user), the following occurs:

- The switch increases fan speed
- The Temp Fault LEDs light up on both the sCTRL and the sFU-8 front panels.

The fan speed also increases when one of the sFUs is not present, or when one of the sFU internal fans is faulty.

On the toolbar, the Temp, the Device, and the Fan icons upper left corners turn red to display a temperature fault and as result, a problem with the device.

4.5.5 Local SM Information

To view local SM information:

Step



Click (SM icon) on the Device toolbar.

The *Local SM* window is displayed in the Information area.

Local SM	
GUID :	0008f1040040049f
SM Key :	0000000000000000
Activity Count :	109426
SM State :	Active
Vendor :	0008f1
GUID Prefix :	00000000100d10c0
LID :	1
Has SM:	No
SM Mode:	Enable

VFM

Figure 4-16. Local SM Information

Table 4-8 describes the Local SM parameters.

Parameter	Description
GUID	Read-only field that displays the GUID of the port where the SM resides.
SM Key	Read-only field that displays the Key of the Subnet Manager (SM).
Activity Count	Read-only field that displays the SM activity count. This Counter increments each time the SM issues an SMP or performs other management activities. Used as a heartbeat indicator by standby SMs.
SM State	Read-only field that displays the current SM state. Possible values are: Standby, Master and Discovering.
Vendor	Read-only field that displays the name of the equipment vendor.
GID Prefix	The GID is a concatenation of a 64-bit subnet prefix (an identifier of the subnet), and a manufacturer-assigned, globally unique ID.
LID	Displays the Local Identifier (LID) number of the port where the SM resides.
Has SM	Indicates if the SM is present in the switch.
SM Mode	If an SM is present in the switch, displays whether the SM is enabled or disabled.

Table 4-8. Local SM Information Parameters

4.5.6 Obtaining Detailed Module Information

VPD (vital product data) is information about a device that is stored on the device itself. This information allows the device to be administered at a system or network level and can be viewed as read-only fields either within each individual module information window or by accessing the Detailed Module Information window.

Typical VPD module information is displayed in the GUI as a read-only field and includes a product model number, a unique serial number, product release level, maintenance level, and other information specific to the device type. Vital product

data can also include user-defined information, such as the building and department location of the device. The collection and use of vital product data allows the switch system to be understood and service provided more quickly.

Detailed VPD module information can be obtained by clicking the **Advanced** button. The detailed Module Information Window is displayed.

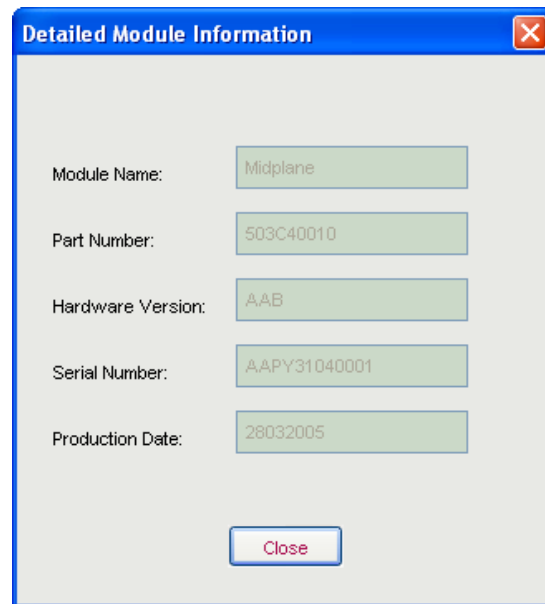


Figure 4-17. Detailed Module Information

This window displays the following additional data:

Parameter	Description
Module Name	More textual information regarding the module.
Port Number	The part number, if applicable.
Hardware Version	The hardware version of the module, if applicable.
Serial Number	The module serial number.
Production Date	The date on which the module was manufactured.

Table 4-9. Detailed Module Window Fields

4.6 Viewing Module Information

Using the Device Manager, you can view graphical information views of the module installed in a switch by selecting the module in the switch graphical representation displayed in the Device Manager main window; for certain modules you can also view this information by selecting the module in the tree view of the Voltaire Device Manager main window.

The LEDs displayed in the graphical information views reflect the actual state of the LEDs on the module. For a description of the ISR 9096/9288 module LEDs, refer to the ISR 9XXX Installation Manual.

NOTE



The windows and views described in this section are mostly relevant to the ISR 9096/9288 switches.

The information described in this section varies according to the module selected, as described below:

- sLB (Line Board) Information on page 4-27
- Port Information, on page 4-17
- CPU Information, on page 4-20
- Temperature Information, on page 4-22
- Local SM Information, on page 4-22

4.6.1 sLB (Line Board) Information

Up to 12 sLBs Line Boards can be installed at the rear of the ISR 9288, up to four can be installed at the rear of the ISR 9096 chassis.

To view the Line Board information:

- Click the desired sLB on the Device Tree. The sLB Information Window appears.

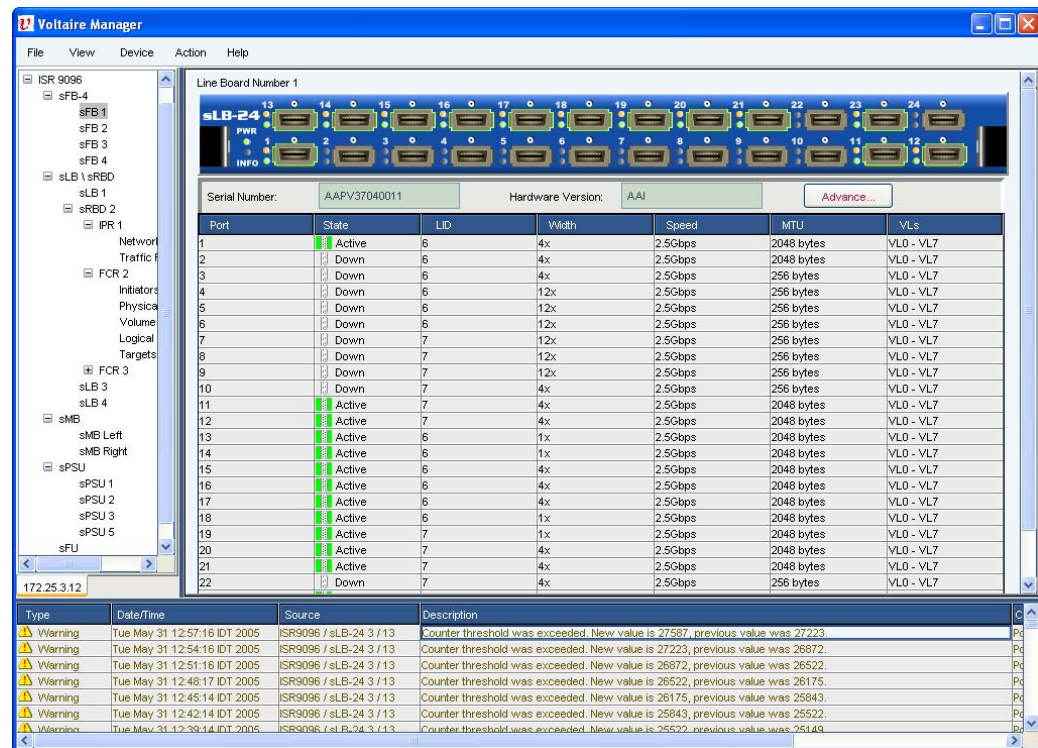


Figure 4-18. sLB Information

sLB Information Window Description

The sLB-24 graphical display of the Line Board at the top of the window shows which ports are active.

The board's basic VPD (Vital Product Data) includes the module Serial Number and Hardware Version. Additional VPD can be obtained by clicking the Advanced Button (refer to Obtaining Detailed Module Information, Section 4.5.6, on page 4-24 for further details).

The center of the window displays the following information on each of the Line Board ports.

Parameter	Description
Port	Displays the port number relative to the sLB.
State	Displays the current state of the port. Possible values are: Down—the switch is non-operational. Initialize—the switch has been powered up and is in initializing. Armed—the port is in armed mode. Active—the switch is operational. The color coding of these fields reflects the status of the port, as follows: Green— indicates that the port is in active state Red – indicates that the port is either in Initialized or Armed status. No color— indicates that the port is down
LID	Displays the port Local ID (LID).
Width	Displays the current link width: 1X, 4X or 12X.
Speed	Displays the current signaling rate of the link: current default is 2.5 Gb/s.
MTU	Displays the Maximum Transmission Unit value of the port.
VLs	Displays the Virtual Lanes supported by the port. Current support is for VLs 0 to 7.

Table 4-10. sLB Information

The lower part of the window displays the status of each port and related events.

sLB-24 (Line Board) Information with MediaConverters

The ISR 9096/9288 provides support for optical converters on Infiniband ports.

When installed on sLB ports, optional MediaConverters have a distinctive graphical representation in the VDM to differentiate them from the IB connector, as shown below.

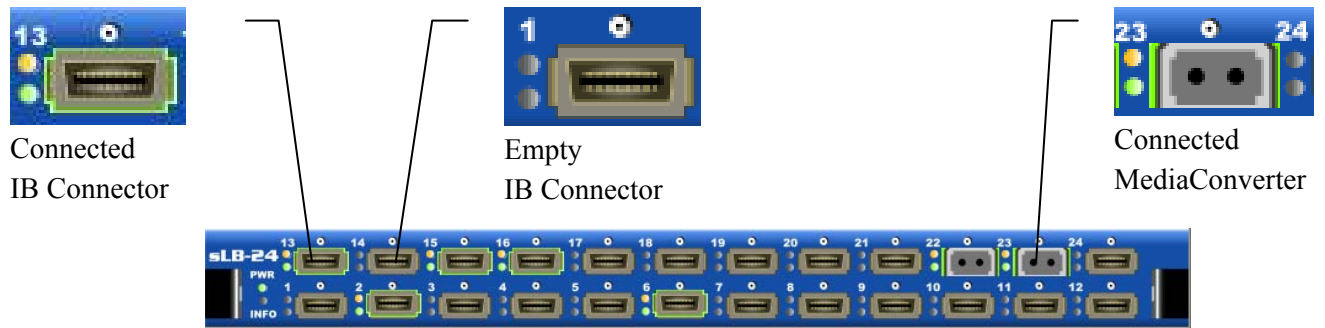


Figure 4-19. sLB-24 with MediaConverters

Further detail is available in the ISR 9XXX Installation Manual.

4.6.2 Fabric Board Information

Up to four Fabric boards can be installed at the front of the ISR 9096/9288 chassis to achieve a fully non-blocking system.

To view the Fabric Board (sFB) information

- Click the desired sFB on the Device Tree. Figure 4-20 and Figure 4-21 respectively display the ISR 9288 and ISR 9096 Fabric Information Windows.



Figure 4-20. ISR 9288 Fabric Board Information



Figure 4-21. ISR 9096 Fabric Board Information

sFB Information Window Description

Each LED corresponds to a group of internal links. LEDs represent the state of the link between the fabric board and the appropriate line.

The blue Hot Swap LED is active when the sFB board is ready to be removed.

The board's VPD (Vital Product Data) is also displayed. Additional VPD can be obtained by clicking the Advanced Button (refer to Obtaining Detailed Module Information, on page 4-24, for further detail).

4.6.3 sMB Board Information

The ISR 9096/9288 chassis supports one or two redundant hot swappable Management Boards (sMB) for fabric management (VFM) and chassis management; when two sMB boards are installed, they support failover capabilities in the event of failure to one of the boards.

None, one or two sMB boards can be installed on the front panel of the ISR 9096/9288 chassis.

The sMB board provides two RS-232 ports, one (I2C port) for debug purposes by authorized personnel only; the second port (CLI) can be used to establish a CLI connection locally to the chassis.

To view the Management Board information:

- Click the desired sMB on the Device Tree. The Management Board Information Window appears.



Figure 4-22. sMB Information

sMB Information Window Description

The sMB graphical display shows when the Subnet Manager and the Chassis Management are active and the status of the power and info LED.

The blue Hot Swap LED is active when the sMB board is ready to be removed.

The board's VPD (Vital Product Data) is also displayed. Additional VPD can be obtained by clicking the **Advanced** Button.

The screenshot shows a window titled "Detailed Module Information" with a close button in the top right corner. The window contains the following fields:

- Module Name: smb
- Part Number: 503C30080
- Hardware Version: AAG
- Serial Number: AAQJ34040002
- Production Date: 14112004
- GUID: (empty field)
- CPLD Version: 000001.1
- PR-PMC Version: 00000000

A "Close" button is located at the bottom center of the window.

Figure 4-23. SMB Detailed Module Information Window

This window displays the following additional data:

Parameter	Description
Module Name	More textual information regarding the module.
Part Number	The part number, if applicable.
Hardware Version	The hardware version of the module, if applicable.
Serial Number	The module serial number.
Production Date	The date on which the module was manufactured.
GUID	The unique identifier of the module.
CPLD Version	The version of the Logic Device
PR-PMC Version	The version of the PowerPC Processor PCI Mezzanine Card

Table 4-11. SMB Detailed Module Information Window Fields

Refer to Obtaining Detailed Module Information, on page 4-24, for further detail.

4.6.4 sCTRL Information

The sCTRL module is installed on the rear panel of the ISR 9096/9288 chassis. It provides the ISR 9096/9288 system management ports (Ethernet and Serial). It also includes a Reset button for the chassis.

To view the sCTRL Module information:

- Click sCTRL on the Device Tree. The sCTRL Information Window appears.

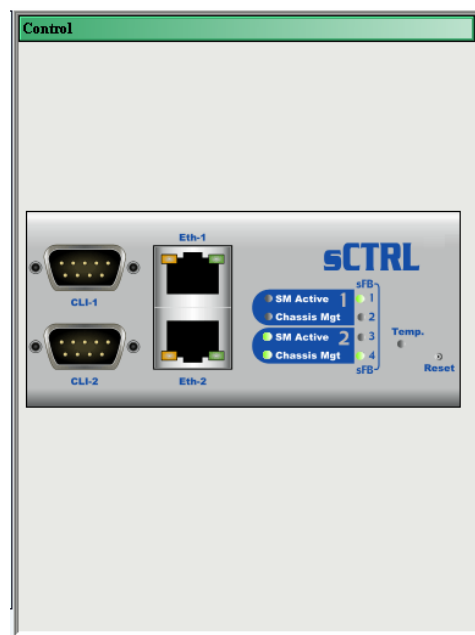


Figure 4-24. sCTRL Information

sCTRL Information Window Description

The sCTRL graphical display shows which sMB is active and whether the Subnet Manager and the Chassis Management are active.

Feature	Description
sMB1 and 2	LEDs show the status of the Subnet Manager and the Chassis Management
sFB	Shows how many sFBs are installed
Ethernet1 and 2	In the system, green: link/orange: active –No indication in the GUI

Feature	Description
CLI1 and CLI2	No indication in the GUI
Temperature	Lights up when there is an excess of temperature
Reset	Resets the chassis

Table 4-12. sCTRL Information Window Features

4.6.5 sPSU Information

Power Supply modules are installed at the rear of the ISR 9096/9288 chassis. Ideally, each Power Supply module line cord should be connected to a different circuit for maximum fault tolerance in the event of power problems.

To view the Power Supply information:

- Click the desired sPSU on the Device Tree. The sPSU Information Window appears.



Figure 4-25. sPSU Information

sPSU Information Description

The green line around the power connector indicates that the power supply is connected to a source of current.

AC ok - DC ok – Green LED means that AC and DC are functional.

4.6.6 Fan Info

The SFU-4 vertical Fan Unit is part of the ISR 9288 air cooling system; it provides cooling of the Line boards (sLBs). It includes four fans with fan speed control; fan speed is dynamically controlled as a function of temperature.

The SFU-8 horizontal Fan Unit is part of the ISR 9096/9288 air cooling system; it provides cooling of the Fabric Boards and the sMBs. It includes eight fans with fan speed control; fan speed is dynamically controlled as a function of temperature.

Fan speed can be either turbo or normal. Refer to the ISR 9096/9288 Fan Speed Algorithm, on page 4-36 for further detail.

To view the fan unit information:

- Click the  icon from the device toolbar. The Fan Units box is displayed.

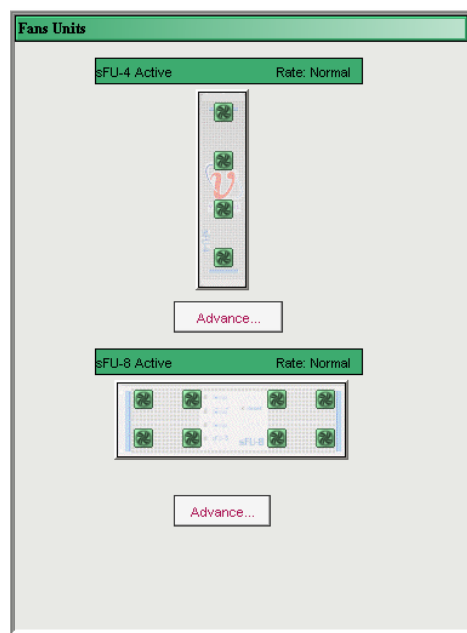


Figure 4-26. ISR 9288 Fan Information

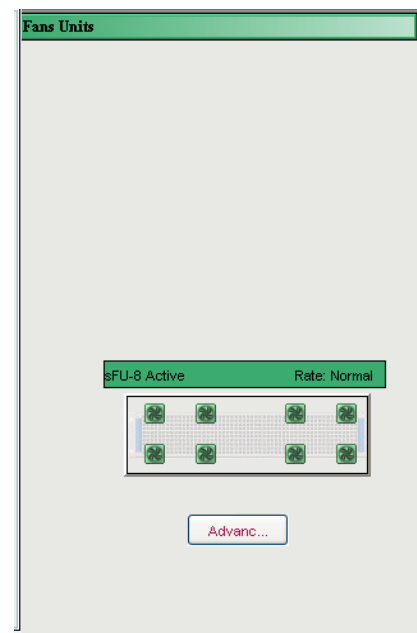


Figure 4-27. ISR 9096 Fan Information

sFU Information Description

Green indicates normal operation.

Should a specific fan unit be faulty, the fan unit is displayed in red in the dialog box and the Status bar at the top of the window is also displayed in red. When this is the case, consult the ISR 9XXX Installation Manual for maintenance instructions.

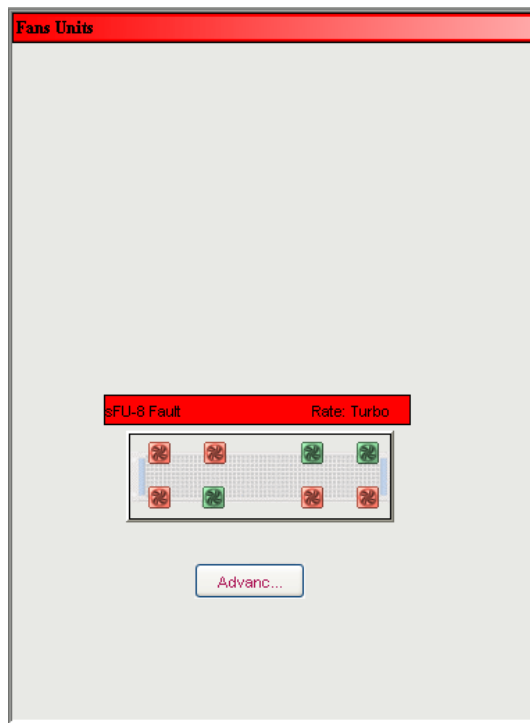


Figure 4-28. Faulty Fan Information

After clicking the Advanced Button, the board's VPD (Vital Product Data) is also displayed. Additional VPD can be obtained by clicking the Advanced Button (refer to Obtaining Detailed Module Information, on page 4-24, for further detail).

ISR 9096/9288 Fan Speed Algorithm

After a power cycle, the fan speed is initialized to turbo. In addition, SMB reboot also sets the fan speed to turbo.

After reboot, the SMB scans the temperature sensors of the chassis modules, including all sFB modules, all sLB modules, SMB, sFU-8 and sFU-4 modules.

If all the temperature sensors are below threshold, the fan rate is set to Normal. If one of the temperature sensors is above the thresholds, the Fan rate is set to turbo. If one of the Fan units is missing, the other unit is set to Turbo. If one of the Fan trays or one Fan in the unit is failing, all the other Fans are set to Turbo.

Each module has three temperature thresholds:

- RELAX threshold
- WARNING threshold
- ALARM threshold

After a successful scan of the sensors of all chassis modules, the fan speed is set to normal under the following conditions:

1. All Sensors are below the WARNING threshold
2. Both sFU-4 and sFU-8 units are present in the chassis (for the ISR 9096, only the sFU-8 should be present)
3. All fans within the fan unit are OK (no faulty fans)

The system periodically scans the chassis. If any of the above conditions fails, fan speed is set to turbo.

A LED also indicates if the temperature is above WARNING threshold on the sFU-8. (If the sFU-8 is removed, there are no other fault LEDs)

NOTE



The temperature of all problematic modules must drop below the RELAX threshold state before the fan speed is set back to normal speed and before the temperature LED turns off.

Whenever a temperature of a specific module goes beyond the WARNING threshold, the system generates a trap reporting the high temperature on the problematic module.

If the temperature of the module further exceeds the alarm threshold (for modules where it is defined), the system generates a trap reporting the more severe temperature

Once the temperature of that module goes back below the relax threshold, the system generates a trap reporting the temperature is back to normal.

The threshold values are:

Module	Celsius			Fahrenheit		
	Relax	Warning	Alarm	Relax	Warning	Alarm
sLB	65°C	70°C	75°C	149°F	158°F	167°F
sFB	55°C	60°C	65°C	131°F	140°F	149°F
sMB	69°C	100°C	-	156°F	212°F	-
sFU	45°C	50°C	-	113°F	122°F	-

Table 4-13. Modules Temperatures Threshold Values

The table of temperatures for each module can be viewed via the VDM. See Temperature Information Section 4.5.4, on page 4-22.

4.6.7 Router Module Information

Optional Router Blades Drawers (sRBD) can be installed with IPR (TCP/IP router) and FCR (Fibre Channel Router) modules. Each Router Blade Drawer can contain up to three router modules.

To view the Router Module information:

- Click the desired Router Module (FCR or IPR) on the Device Tree. The Router Module Information Window appears.

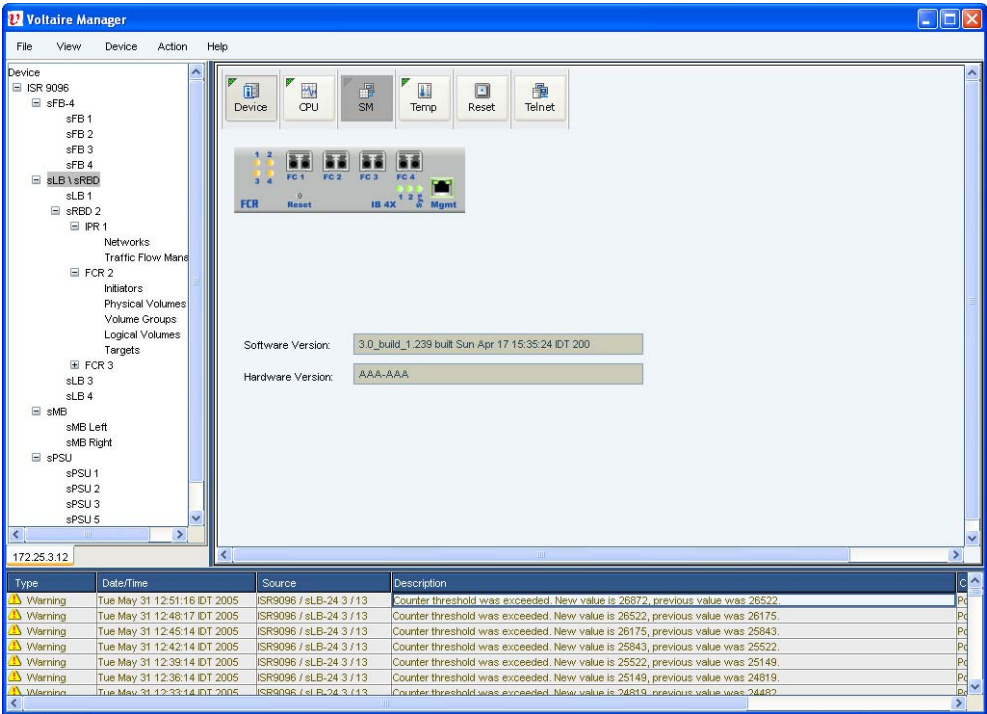


Figure 4-29. Router Module Information

The board’s VPD (Vital Product Data) is also displayed.

For instructions on how to manage the router modules via the Device Manager, refer to the *IPR User Manual* and the *FCR User Manual*.

4.7 Using the Voltaire Device Manager for Switch Management

The Voltaire Device Manager allows you to configure the following device settings:

- IP Settings, on page 4-39
- Remote Management, on page 4-40
- User Passwords, on page 4-42
- FTP settings, on page 4-43

4.7.1 IP Settings

The IP Settings dialog box enables you to view the routing mode of your device.

To View Configured IP Settings:

- Step 1** Select *Device/IP Settings* from the Main Menu. The *IP Settings* dialog box opens as displayed in Figure 4-30.

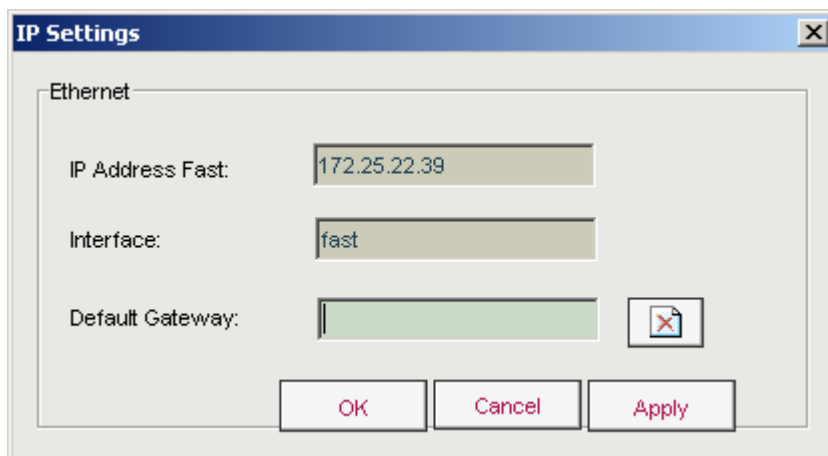


Figure 4-30. IP Settings

Table 4-14 describes the IP parameters displayed in the dialog box.

Parameter	Description
IP Address	Displays the IP address of the switch's Fast Ethernet port.
Default Gateway	Displays the Fast Ethernet gateway address of the switch.

Table 4-14. IP Setting Parameters

Step 2 Click **OK** or **Cancel** to close the screen.

4.7.2 Remote Management Setting

The Remote Management Settings dialog box enables you to set SNMP parameters to interface with remote management systems, and to provide general details of the remote management system.

To Configure Remote Management Settings:

Step 1 Select *Device/Remote Management Settings* from the Main Menu. The *Remote Management Settings* dialog box opens, as displayed in Figure 4-31:

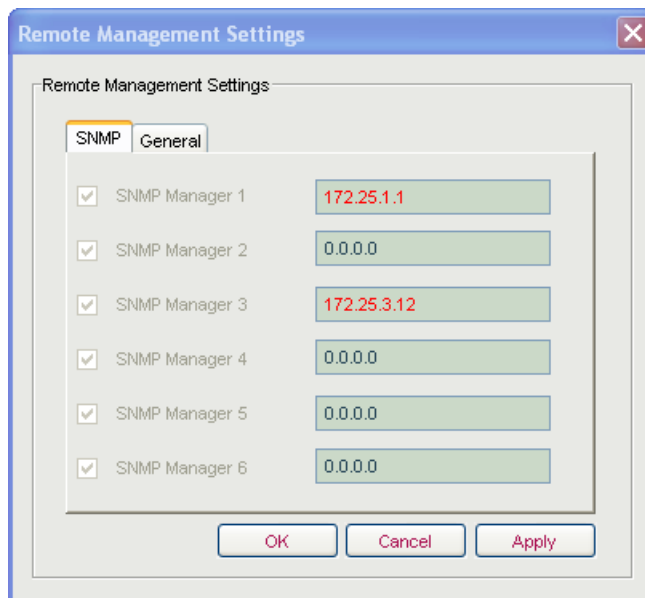


Figure 4-31. Remote Manager Settings: SNMP Tab

Step 2 Click the **SNMP** tab. Enter the IP address. The relevant check box will be marked automatically.

Change or reactivate the existing IP address: Click the relevant SNMP Manager check box and then type in the relevant IP address.

Step 3 Click **OK**.

Step 4 Click the **General** tab.

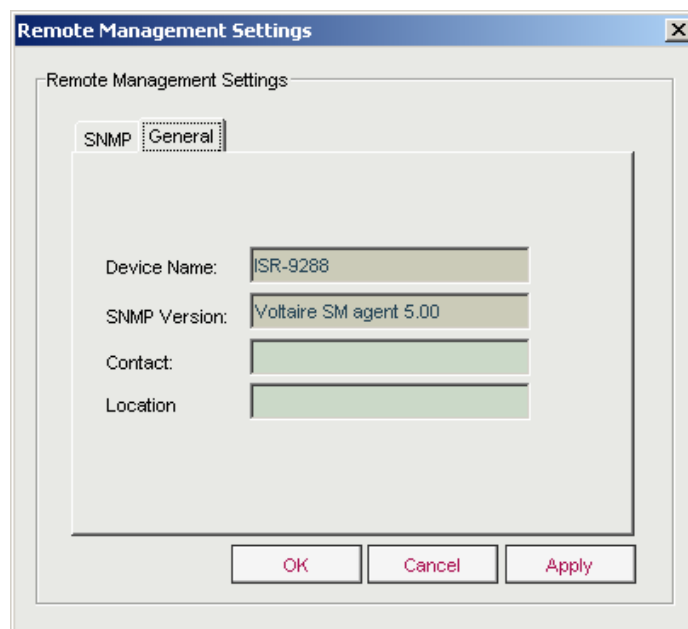


Figure 4-32. Remote Manager Settings: General tab

Step 6 Fill in the following fields:

- | | |
|----------------------|---|
| Device Name: | Describes the device name in a read-only field. |
| SNMP Version: | Displays the software version of the SNMP in a read-only field. |
| Contact: | Details of the contact of the device. |
| Location: | The location of the device. |

Step 7 Click **Apply** to save parameter changes and **OK** to save parameter changes and exit the dialog box.

4.7.3 User Settings

The Voltaire Device Manager allows you to configure three types of user authorization:

- The Administrator level enables you to change user password configuration, to export or import configurations and more. The default password is 123456.
- The Manager level enables you to set the parameters. The default password is *voltaire*.
- The Guest level enables you to view configurations only. The default password is *voltaire*.

To Configure Authorization Passwords:

- Step 1** Select *Device/Users* from the Main Menu. The *Users* window opens, as displayed in Figure 4-33:

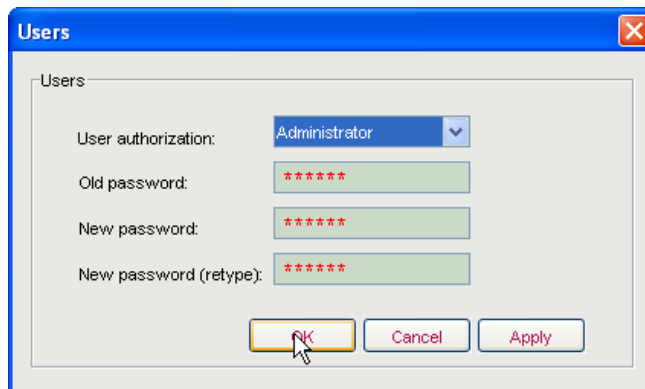


Figure 4-33. Configuring User Authorization

- Step 2** Select the user authorization to assign to the user (Guest, Manager, Administrator) from the Authorization field.
- Step 3** Type in old user password.
- Step 4** Type in the new password and confirm it by typing it again in the New Password (retype) field.
- Step 5** Click **OK** and **Apply** to save the new entry.

4.7.4 FTP Configuration

The FTP configured for use with the switch is used for the following:

- Upgrading software versions
- Uploading log files to the remote server
- Uploading/downloading the repository file.

To Configure FTP Settings:

- Step 1** Select *Device/Config FTP* from the Main Menu. The *Config FTP* window opens, as displayed in Figure 4-34.

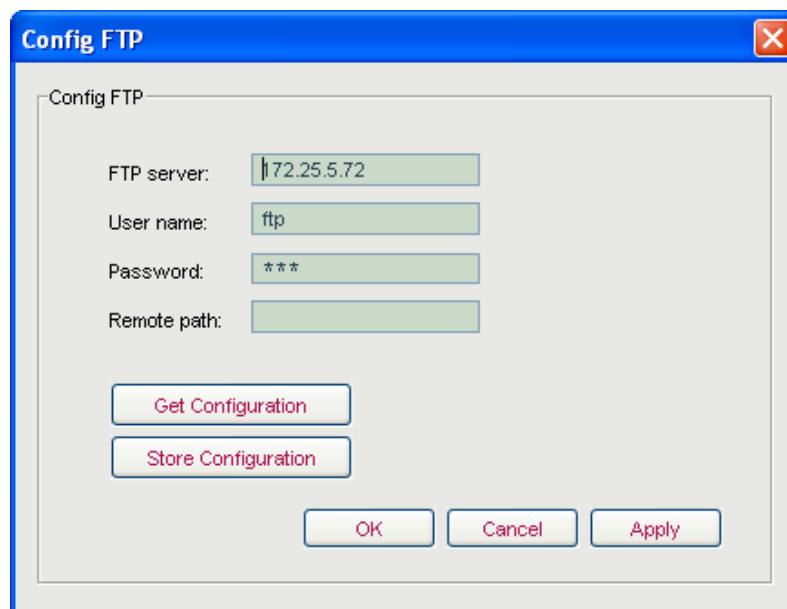


Figure 4-34. Configuring FTP

- Step 2** To configure the FTP server, fill in the configurable fields as follows:

FTP Server	The FTP Server IP Address
User name	The User Name of the FTP holder
Password	FTP Server Password
Remote Path	Remote path processing

- Step 3** Click **Get Configuration** to download the switch configuration file (also called repository file) from the ftp server.

- Step 4** To upload a file that stores the switch configuration (for backup) click **Store**

Configuration – the switch configuration file is stored on the configured FTP server.

Step 5 Click **OK** and **Apply** to save the new entry and close the window.

4.8 Reset Operations

The Voltaire Device Manager has several reset options.

- Resets the entire switch (hardware reset, in ISR 9096/9288 switches only)
- Resets a Line or Fabric Board (in ISR 9096/9288 switches only)
- Reset the CPU (software reset), available in all switches.

To reset the entire switch:

NOTE



This option is only relevant for ISR 9096/9288 switches.

This operation resets the entire switch. It should only be used when you need to reset all switch modules; it typically follows a firmware upgrade, or when faulty operation of the switch is suspected.

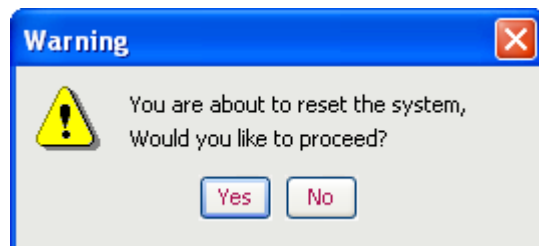
CAUTION



This is a traffic affecting operation.

- Right click on a relevant Fabric Board (front panel of device view) or a relevant Line Board (rear panel of device view) and select *Reset All*.

The following popup window is displayed.



- Click **Yes** to initiate the reset operation. The operation can take several minutes. Watch the Trap Table to see when the switch modules are back online.

To reset a Line/Fabric Board (in ISR 9096/9288 Switches):

NOTE



This option is only relevant for ISR 9096/9288 switches.

- Right click on a Fabric Board (front panel of device view) or a Line Board (rear panel of device view) and select *Reset sFB* or *Reset sLB*.

CAUTION



This is a traffic affecting operation.

To reset the Management Board (software reboot):

This operation will typically be performed when faulty operation of the Voltaire Device Manager software is suspected. This operation does not affect the InfiniBand traffic.

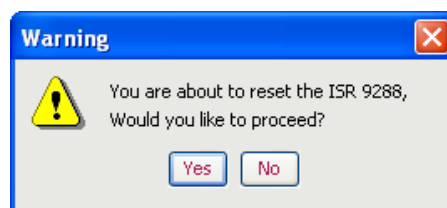
- From the main window toolbar, click



OR

- From the main menu, select *Action—Reset*.

The following popup window is displayed.



- Click **Yes** to complete the reset.

Chapter 5. Partitioning

Partitioning enforces isolation among systems sharing an InfiniBand fabric.

Partitioning describes a set of endnodes within the fabric that may communicate.

Each port of an endnode is a member of at least one partition and may be a member of multiple partitions. A partition manager assigns partition keys (Pkeys) to each channel adapter port. Each Pkey represents a partition.

Reception of an Invalid Pkey causes the packet to be discarded.

Switches and routers may optionally be used to enforce partitioning.

Partitioning can be used to associate hosts or devices with common attributes, as shown in the diagram below.

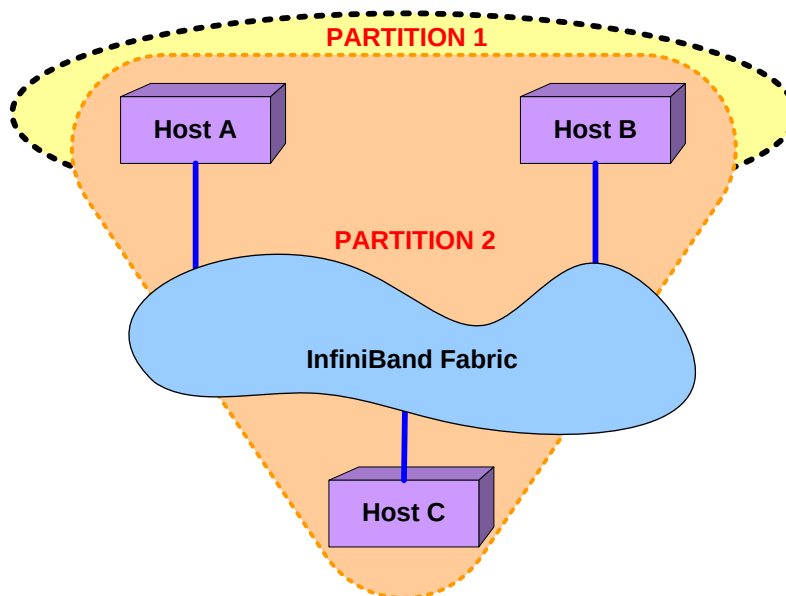


Figure 5-1. Partitioning Block Diagram

5.1 Mechanisms Used to Create and Enforce Partitions

1. Each HCA port has a partition table defining the partitions that can be accessed by that HCA port.
2. The SM initializes each HCA port partition table.
3. The SA answers Pkey path queries by looking for a common Pkey between the two endnodes.
4. IPoIB is used to create multiple IP domains, one for each partition, providing name/address resolution. Each IPoIB instance uses a separate QP (Queue Pair) associated with a separate Pkey partition.
5. Each Multicast group is associated with a partition. In the case of IPoIB, there is a well known MGID – Pkey mapping.

5.2 Setting Partitioning

Using ISR 9096/9288 CLI, it is possible to configure fabric partitioning by setting the Partition Keys (P Key) to a partition table.

The ISR 9096/9288 partitioning Pkey configuration is organized in table format, with a row per node port GUID based on user configuration (associating a port with a list of Pkeys).

Pkey configuration is arranged as a table in the repository, a row per port guid.

Every port may be added up to 16 partitions.

Row 0 in the table corresponds to the default Pkey configuration. This entry is protected and cannot be removed.

Port-GUID	Pkey0	Pkey1	Pkey2	...	Pkey14	Pkey15
0 (default)	0xFFFF	0	0	0	0	
GUID 1						
...						
GUID N						

Table 5-1. Pkey Table in Repository

The SM either configures the HCA with the Pkey table as configured in the repository for that port GUID, or uses the default Pkey table for that port.

This feature is disabled by default, and may be enabled by CLI.

The SM reconfigures the port when table is changed or port is reconnected.

For each fabric node port, a Pkey partition may be added to total up to 16 partitions.

Row 0 in the table corresponds to the default Pkey configuration. This entry is protected and cannot be removed.

Unless configured otherwise, all existing node ports are assigned the default Pkey 65535 (ffff).

To view Pkey Commands, use the CLI to enter the following information:

	Command	Description
Step 1	Enable [password]	Enter Privileged mode (from Exec mode). (the default password is voltaire):
Step 2	Config	Enter Config mode from the Exec mode. Type the password when prompted.
Step 3	sm	Enter sm configuration.
Step 4	? pkey	Enter ? pkey. The following commands appear.

```
ISR9XXX(config-sm)#
ISR9XXX(config-sm)# ? pkey
pkey delete          pkey delete [row > 1 ]
pkey high show       pkey high show
pkey low show        pkey low show
pkey port-guid set   pkey port-guid set [row > 1] [guid]
pkey set              pkey set [pkey-number] [row] ['0x'hex]
pkey update          pkey update
```

To set partitioning:

- Step 1** Begin with enabling the partitioning feature by running the command `partitioning-enable set enable`.
- Step 2** Reviewing the ISR 9096/9288 partition table, use the CLI commands `pkey high show` and `pkey low show`. The low show command will display partition table columns 0-8. The high show command will display partition table columns 9-15, as follows:

```
ISR9XXX(config-sm)# pkey low show
entry Port-GUID      Pkey0 Pkey1 Pkey2 Pkey3 Pkey4 Pkey5 Pkey6 Pkey7
|---|-----|-----|-----|-----|-----|-----|-----|
1  0000000000000000 ffff 0    0    0    0    0    0    0
```

Note: row #1 is the default, relates to each host and cannot be erased.

```
ISR9XXX(config-sm)# pkey high show
entry Port-GUID      Pkey8 Pkey9 Pkey10 Pkey11 Pkey12 Pkey13 Pkey14 Pkey15
|---|-----|-----|-----|-----|-----|-----|-----|
1  0000000000000000 0    0    0    0    0    0    0    0
```

- Step 3** Use the `pkey set` CLI command to add a partition to the ISR 9096/9288 partitioning table. When adding a partition you need to specify the P_key number [0-15], table number and the P_key value.

Example:

```
ISR9XXX(config-sm)# pkey set pkey9 1 0xf1f1
Change will be effective only after 'pkey update' command
```

- Step 4** When setting a Pkey to a specific node port by GUID, use the CLI command `pkey port-guid set` to create a new table entry for a specific GUID, as shown in the example below.

```
ISR9XXX(config-sm)# pkey port-guid set 2 0x11111111
```

- Step 5** Verify that the entry was added to the table by using the CLI pkey low or high show command, as shown below.

```
ISR9XXX(config-sm)# pkey low show
```

entry	Port-GUID	Pkey0	Pkey1	Pkey2	Pkey3	Pkey4	Pkey5	Pkey6	Pkey7
1	0000000000000000	ffff	0	0	0	0	0	0	0
2	0x11111111	0	0	0	0	0	0	0	0

- Step 6** Once created use the command pkey set to define the Pkey value.

For example:

```
ISR9XXX(config-sm)# pkey set pkey0 2 0xf1f1
```

Change will be effective only after 'pkey update' command

- Step 7** Verify that the new pkey was added to the table by using the CLI pkey low or high show command, as shown below.

```
ISR9XXX(config-sm)# pkey low show
```

entry	Port-GUID	Pkey0	Pkey1	Pkey2	Pkey3	Pkey4	Pkey5	Pkey6	Pkey7
1	0000000000000000	ffff	0	0	0	0	0	0	0
2	0x11111111	f1f1	0	0	0	0	0	0	0

- Step 8** Run the command pkey update to update the Pkey table.

NOTE



The Partition Table update of the all HCA elements in the Fabric takes a few seconds.

To erase a row from the Pkey Table:

- Step 1** Use the Pkey delete command, as shown in the example below.

```
ISR9XXX(config-sm)# pkey low show
```

```
entry Port-GUID      Pkey0 Pkey1 Pkey2 Pkey3 Pkey4 Pkey5 Pkey6 Pkey7
|--|-----|-----|-----|-----|-----|-----|-----|-----
1  0000000000000000 ffff  0   0   0   0   0   0   0
2  0x11111111      f1f1  0   0   0   0   0   0   0
```

```
ISR9XXX(config-sm)# pkey delete 2
```

Change will be effective only after 'pkey update' command

Row 2 has been deleted from the table in this example.

- Step 2** Verify that the row was removed from the table by using the CLI pkey low or high show command, as shown below.

```
ISR9XXX(config-sm)# pkey low show
```

```
entry Port-GUID      Pkey0 Pkey1 Pkey2 Pkey3 Pkey4 Pkey5 Pkey6 Pkey7
|---|-----|-----|-----|-----|-----|-----|-----|-----
1  0000000000000000 ffff  0   0   0   0   0   0   0
```

- Step 3** Run the pkey update command to update the Pkey Table.

To delete a pkey from a specific row:

- Step 1** Use the `pkey set` command and set it to 0 (zero), as shown in the example below:

```
ISR9XXX(config-sm)# pkey low show
```

entry	Port-GUID	Pkey0	Pkey1	Pkey2	Pkey3	Pkey4	Pkey5	Pkey6	Pkey7
1	0000000000000000	ffff	7554	0	0	0	0	0	0

```
ISR9XXX(config-sm)# pkey set pkey1 1 0x0
```

Change will be effective only after 'pkey update' command

- Step 2** Verify that the pkey (7554 in this example) was removed from the row by using the CLI `pkey low` or `high show` command, as shown below.

```
ISR9XXX(config-sm)# pkey low show
```

entry	Port-GUID	Pkey0	Pkey1	Pkey2	Pkey3	Pkey4	Pkey5	Pkey6	Pkey7
1	0000000000000000	ffff	0	0	0	0	0	0	0

- Step 3** Run the `pkey update` command to update the Pkey Table.

Chapter 6. Fabric Diagnostic

In This Chapter

This chapter describes information on logging and monitoring functions that provide customers with advanced fabric debugging and failure detection capabilities. This includes information on the following topics:

- Overview, on page 6-3
 - The Event Notification Mechanism
 - When is Fabric Diagnostic Performed?
 - Potential Fabric Problems
 - Procedures and Tools used for Problem Identification
- Fabric Inspect Settings, on page 6-8
 - Configuring the PortCounters.csv file via the CLI
 - Configuring PM Using the Fabric Manager
- Diagnostic Tools, on page 6-11
 - Displaying and Checking Port Counters using the GUI
 - Fabric Diagnostic using the Event Log
 - Fabric Diagnostic Using Current Alarm
 - Fabric Diagnostic Using Fabric Statistics (portcounters.csv file)
- Additional Tools and Examples, on page 6-18
 - Detecting and Troubleshooting 1X Cable Width Problems
 - Identifying a Bad Line Board or Fabric Board Port
 - Identifying a Bad Port
 - Some CLI Diagnostic Tools

Managing Alarms and Events on page 3-22 provides information on using the Fabric Manager for initial alarm detection and handling.

Appendix B - lists the available *Port Counters*, describes the PortCounter Fields and Summary report.

Appendix C – Defines the trap structure and lists the Supported Traps and Events in the Alarm Table.

6.1 Overview

Voltaire's Fabric Manager enables fabric connectivity debugging using the built-in Performance Manager (PM). PM has two major capabilities:

- **Port Counters Monitoring and Report.** The PM generates a periodic port counters report file (in CSV format) that can be loaded to Excel and further analyzed by the user. It also monitors port counters errors and reports every port that passed its error threshold limit (as configured by the user).
- **Event Logging.** Creates an event log file for both IB traps and SM internal events. The user may filter the events using the GUI and CLI. The filtering policy determines for each event whether it is logged and whether a trap is generated.

The fabric diagnostic tool is essential to identify any problem ports and node connectivity problems prior to running application as well as during standard operation.

The following diagram illustrates the Diagnostic Features.

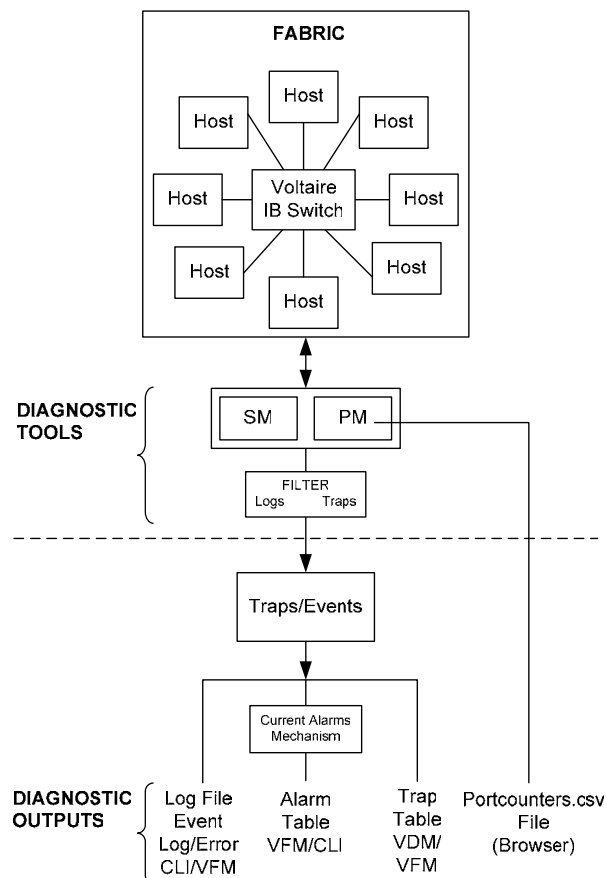


Figure 6-1. Diagnostic Block Diagram

6.1.1 The Event Notification Mechanism

Fabric related events can be generated by both the PM (Performance Monitor) and by the SM (Subnet Manager).

The PM periodically scans the error counters and of all IB elements in the fabric and reports if a counter exceeds its threshold

The SM monitors the fabric, detects configuration changes and dynamically configures the new elements and new routes in the fabric. The SM can detect fabric errors/warnings/informative events and report them.

Both, the PM and the SM generate events and report them to the event notification mechanism.

In addition, events may be generated in the fabric and sent to the SM by fabric elements. The SM reports those events as well.

The event mechanism can do the following actions with each event:

- a. Log the event in the event log
- b. Issue a trap to the GUI session
- c. If the event corresponds to an alarm, it is also sent to the current alarm mechanism

The GUI Color coding is defined according to traps and events severity, as described below.

GUI Color-Coding	Event Severity	Description	Examples
Red	Critical/Major	Critical means that the system or a system component fails to operate.	Invalid link Duplicate or conflicting ports or path
Yellow	Warning/ Minor	Warning/minor reflects a problem in the fabric but does not prevent its operation. A warning is asserted when an event is exceeding a pre-defined threshold.	Broken link Illegal connections between two sLB ports
Green	Normal	Information/Notification provided to the user of normal operating state or a normal system event.	Complete subnet reconfiguration Create/Delete Multicast group Applied routing scheme Port State Change

Table 6-1. Event Severity and Color Coding Table

The user may filter the events using the GUI and CLI. The filtering policy determines for each event whether it is logged and whether a trap is generated.

6.1.2 When is Fabric Diagnostic Performed?

Diagnostic is recommended in the following cases:

- During Fabric installation and during startup
- Before running an application
- Performance problems (by locating discarded packets and link integrity problems)
- MPI job run problem, To locate malfunctioning nodes and get the overall fabric structure.
- Additional problems related to fabric stability, blocking or other.

6.1.3 Potential Fabric Problems

It is critical to verify the that fabric is clean to ensure optimum application performance and prevent premature job completion

Cleaning the fabric includes looking for:

- 1X Links
- Bad connections
- High Error Rates
- Congestion
- Other patterns that may indicate an issue

6.1.4 Procedures and Tools used for Problem Identification

Tools available to perform diagnostic:

- Use the Topology Map to see current problems
- The Error Log
- The Bad Ports Log
- The Current Alarms Table
- The Fabric Statistics portcounters.csv file

High-Level Diagnostic Tools Overview

1. Enable the SM Fabric Inspect preferences for debugging Fabric Failure.
2. Use the VFM/VDM **Port Counters Information and Graph** window to check a specific port counter's health
3. Use the **Event Log** to discover that there is a problem in the fabric. In the VFM, right click and select View Event to get information to help identify where problem is located. Alternatively, you can show the Event Log from the CLI.
4. Use the **Current Alarms** Table to see current problems. In the VFM, right click and select Alarm Data to get information to help identify where the problem is located
5. Use the **Topology Map** to identify nodes with a current alarm
6. Proactively look for increasing error counters using the statistics feature and running the Diagnostic scripts using the CLI

Fabric Diagnostics Methodology

For a successful InfiniBand fabric diagnostic please follow these guidelines:

1. Enable the port counters reports
2. Run stress traffic across all fabric nodes
3. Get the port counters portcounters.csv file and/or or Current Alarm Table
4. Review Fabric active port nodes counters
5. Locate problem (see list of Potential Problems, Section 6.1.3)
6. Fix the problem
7. Reset counters
8. Run Traffic across the fabric again
9. Verify that the problem is fixed
10. Repeat the above until all fabric nodes have No bad link error (there might be error counters that are > 0 and not problem related)

6.2 Fabric Inspect Settings

To Configure the System for Fabric Inspection:

- Step 1** Use the CLI to Enable PM collection and PM reports, as described in Section 6.2.1 below. The system is collecting all port data and errors.
- Step 2** Define PM thresholds using the Fabric Manager, as described in Section 6.2.2 below.
- Step 3** Set Event Filters, as required, as described in the Setting Event Filters Section, on page 3-29.

6.2.1 Configuring the PortCounters.csv file via the CLI

This allows you to collect all the port data and errors within the system.

- Telnet the switch IP and Log into the management CLI using Username admin, password 123456

	Command	Description
Step 1	<code>enable [password]</code>	Enter Privileged mode (from Exec mode).
Step 2	<code>config</code>	Enter Config mode from the Exec mode. Type the password when prompted.
Step 3	<code>sm</code>	Enter Subnet Manager configuration mode.
Step 4	<code>pm</code>	Enter PM configuration mode.
Step 5	<code>pm report-enable set enable</code>	Enable PM data collection and failure reports. Wait for three minutes to allow error counters file to be updated.

Refer to Appendix A on page A-1 for the complete list of the CLI PM commands.

6.2.2 Configuring PM Using the Fabric Manager

NOTE



In order to manage PM data using the Fabric Manager, PM collection must first be enabled using the CLI as described in Section 6.2.1.

This tool is used to configure the current Alarms and Event Log.

To define the PM settings using the VFM:

- Step 1** Select *Fabric/Fabric Inspect/Settings* from the VFM main menu. The following dialog box is displayed.

Thresholds	
☒ Symbol Err Counter:	200
☒ Err Recovery Cntr:	1
☒ Downed Cntr:	1
☒ Port Rcv Err:	5
☒ Rcv Rem Phys Err:	5
☐ Rcv Switch Relay Err:	0
☒ Xmit Discard:	5
☒ Xmit Constraint Err:	5
☒ Rcv Constraint Err:	5
☒ Local Link Integrity Err:	5
☒ Excess Buf Over run Err:	5
☒ V15 Dropped:	5
☐ Xmit Data:	0
☐ Rcv Data:	0
☐ Xmit Pkts:	0
☐ Rcv Pkts:	0

Figure 6-2. PM Settings

By default, PM counters are monitored for all devices in the fabric (*Scope* field is set to All).

To change these settings, select one of the following values from the *Scope* field:

- Hosts Only—PM data is only collected for HCAs in the fabric
- Switches only—PM data is only collected for switches in the fabric

You can also disable selected PM counters by unchecking the box displayed next to the counter.

- Step 2** In the *Sample Interval* field, set the frequency at which the PM data is collected from the counters; range: 60 seconds to 65535 seconds.

NOTE

The *Thresholds Type* in the current software release is always set to *Per sample*, i.e. the Fabric Manager checks for errors in each sampling, if the threshold is passed between samples (interval). The counter is reset when it reaches its maximum value as defined in the InfiniBand specification.

- Step 3** Disable the Thresholds you don't want to have checked.
- Step 4** Click **Reset** to reset the PM counters in all fabric devices.
- Step 3** Click **Apply** to save PM configuration.
- Note:** Data entered appear in red until clicking Apply.
- Step 5** Click  to return to the previously saved settings.

Fabric Port Counters are listed and detailed in Appendix B.3.

6.3 Diagnostic Tools

6.3.1 Displaying and Checking Port Counters using the GUI

Both Voltaire's Fabric and Device Managers allow you to view statistics for active ports and detect faulty ports; the statistics are collected according to a user-defined time interval.

The port Counters Info and Graph show the port traffic transfer in real-time as well as errors, if any.

To display the Port Counters dialog box and start the counters:

- Step 1** From the VFM Main Menu, select the port in the main window and then select Port/Port Counters or right-click the port and select Port Counters.

In the VDM graphical representation, right-click the active port.

The following dialog box is displayed.

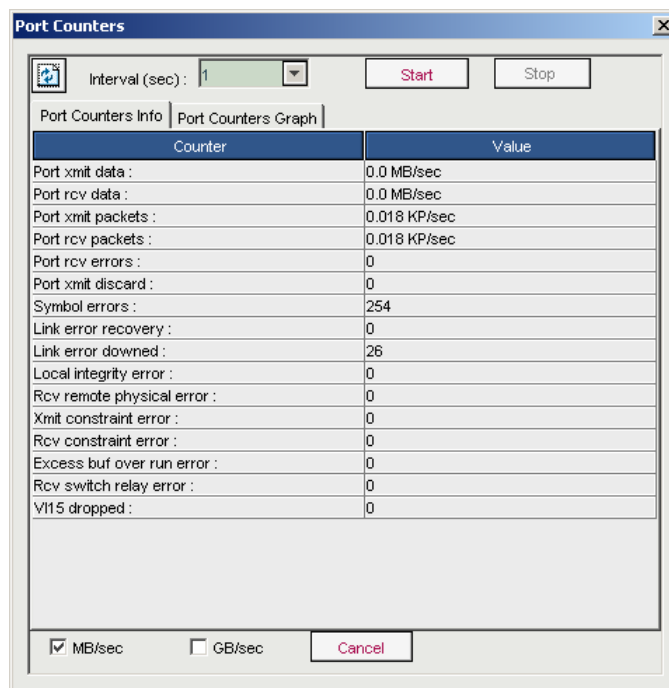


Figure 6-3. Port Counters Information

- Step 2** In the *Interval (SEC)* field, enter the time interval in seconds. After each interval has elapsed, the counters are reset and new values are accumulated.
- Step 3** At the bottom of the dialog box, select the measurement units to display the counters in (MB/sec or GB/sec).
- Step 4** Click **Start**. To stop counting, click **Stop**.
- Step 5** Check the port's health status



Click  to refresh the dialog box.

NOTE



The counters displayed in the dialog box vary according to the selected port.

Checking a Port using the Port Counters Graph

Port counters information can also be displayed in graphic format, as a chart.

To display the Port Counters Graph:

- Step 1** Click the **Port Counters Graph** tab. The following dialog box is displayed.

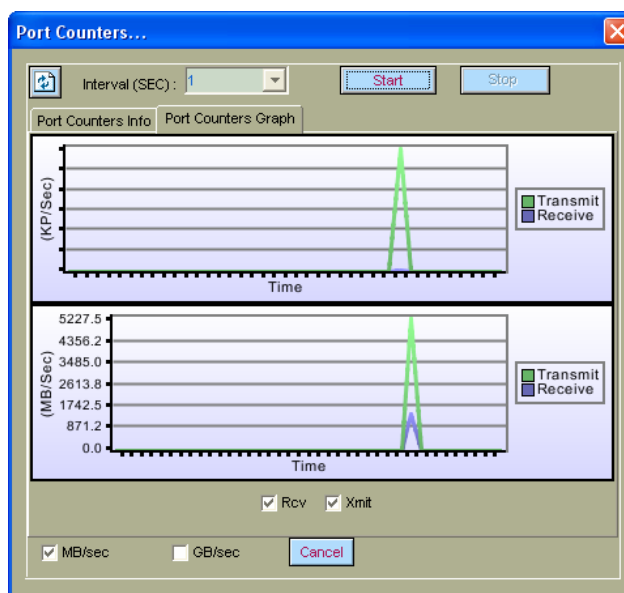


Figure 6-4. Port Counters Graph

- | | |
|---------------|---|
| Step 2 | In the <i>Interval (SEC)</i> field, enter the time interval in seconds. After each interval has elapsed, the counters are reset and new values are accumulated. |
| Step 3 | At the bottom of the dialog box, select the measurement units to display the counters in (MB/sec or GB/sec). You can also display the counters for TX or RX separately. |
| Step 4 | Click Start . To stop counting, click Stop . |

6.3.2 Fabric Diagnostic using the Event Log

The Events Log provides information on the events in the system.

The Event Log records InfiniBand-specific events (traps) and SM internal events in a file format. They are then reported to the user as management via the VFM or the CLI Event Log file.

To display the contents of the Events Log:

- Step 1** Select *Fabric/Fabric Inspect/Event Log* from the VFM main menu. A window is displayed with the event log. You can copy and paste the information to a text file, e.g. using MS Word.

OR

From the CLI Utilities Menu, use the `error-log show` command to display the error log.

- Step 2** Inspect the file for event monitoring or to discover whether there is a problem in the fabric.

The following is an example of an error log reported through the CLI menu.

```
ISR9XXX(utilities) event-log show
Jul 13 09:49:55 0 vsm[414]: CREATE MC GROUP: MGID
ff12401bfffff0000000000000ffffff
Jul 13 09:49:56 0 vsm[414]: SM STATE CHANGE: Entering SM
Discovering State
Jul 13 09:49:56 0 vsm[440]: SM STATE CHANGE: Entering SM
Master State
Jul 13 09:49:56 0 vsm[440]: 0008f104003f074e,      port 22 -
1X port was found [ Port-GUID 8f104003f074e IB Port 22. Peer
at: 0008f104003f074e,      port 24 Port-GUID 8f104003f074e IB
Port 24. ]
Jul 13 09:49:56 0 vsm[440]: 0008f104003f074e,      port 24 -
1X port was found [ Port-GUID 8f104003f074e IB Port 24. Peer
at: 0008f104003f074e,      port 22 Port-GUID 8f104003f074e IB
Port 22. ]
```

This example shows that the diagnostic tool detected 1X link problems and the ports or the peer node that generated this error.

Refer to page A-19 for further information on the CLI event-log command.

**NOTE**

The Event Log only saves information since the last device reboot.

6.3.3 Fabric Diagnostic Using Current Alarm

When the event corresponds to an alarm, it is sent to the current alarm mechanism.

Current Alarms Mechanism

When an alarm is detected, related traps are issued.

- A database of alarms is created per object
- The user can view the alarms via CLI & GUI
- The current alarm Database includes:
 - Unique objects (system, subsystem, port#)
 - Alarm description
 - Severities
- Manually corrective actions, such as clear alarms.
- The GUI will give a graphic representation of the fabric with color coding and different filtering capabilities

Refer to Appendix B.3. for a list of errors.

RECOMMENDATIONS ON HOW TO WORK WITH CURRENT ALARMS

1. Viewing Alarm Information

Alarms can be viewed either through the event log, the portcounters.csv file, or the Alarm Table which are accessible through both, the VFM and the CLI. The CLI `alarm show` command can also be used to view Alarms.

The Trap/Alarm Table in Appendix C, Section C.2 lists all alarms currently available. You can use this table to identify the type of problem and fix it.

Each alarm is listed with its alarm severity, alarm type and the object where the alarm has occurred.

2. Look for the Alarm Appearance

Traps and alarms are issued according to the degree of severity, which can be one of the following: *Normal*, *Warning*, *Minor*, *Major*, *Critical*.

In the GUI, the following color coding is used to indicate the status of objects and events. Color coding is defined according to severity.

3. Filter Specific Alarms

The user may filter the events using the GUI and CLI. The filtering policy determines for each event whether it is logged and whether a trap is generated.

Use the VFM Setting Event Filters window or the CLI to set the desired Current Alarms to display all alarm states or only specific Alarm States. By default the table view shows all nodes regardless of alarm state (All box is checked). Check one or more boxes. By applying event filters, you can limit the types of events that are reported in the Fabric Manager Event Log.

4. Identify the problem and troubleshoot as required.

Refer to Appendix B.3 for a list of errors.

5. Clearing the Alarm

Alarms can either be cleared via the GUI by right-clicking the Trap Table or via the CLI by using the following commands:

<code>alarm clear</code>	Clear Current alarms entry.
<code>alarm clear-all</code>	Clear all Current alarms entry.

6.3.4 Fabric Diagnostic Using Fabric Statistics (portcounters.csv file)

Using the Fabric Manager, you can save a file in CSV format that lists a wide range of statistics for all active nodes and their active ports in the fabric. This includes information such as Node name, InfiniBand IPOIB IP address, Chassis component, PM data, failure reports, and a detailed port counters summary, as shown in the example below.

Port Counters Summary

```
=====
Alert Ports:      8
Total Switches:  22
Switch Ports:     8
Switch Alert Ports: 7
Total HCAs:       1
HCA Ports:        1
HCA Alert Ports:  1
```

The csv file also displays the port's peer node showing to which node and port it is connected. Each active node port information is presented in a single line per port.

The example below shows a CSV report:

LID	IBPort	PortGUID	NodeType	Width	State	MTU	NumVLs	HOQlife
720	12	0008f104003f0670	Switch	4X	ACTIVE	2048	VL0-VL7	13
PlatformType	ModuleType	ModuleIndex	Port	Name		NodeIP	DeviceID	
ISR 9288	sLB-24	5	internal#12	ISR9288-0061b		192.168.60.200	5a09	
MLID(#JoinedGroups)	SymErr	LinkRecovers	LinkDowned	RcvErr	RcvRemotePhys	RcvSwitchRelay		
0000(#0)	0	0	0	0	0	17575		
MLID(#JoinedGroups)	SymErr	LinkRecovers	LinkDowned	RcvErr	RcvRemotePhys	RcvSwitchRelay		
0000(#0)	0	0	0	0	0	17575		
XmtDiscards	XmtConstraint	RcvConstraint	LocalLinkInteg	ExcessBufOvrrun	VL15Dropped	XmitBytes		
1	0	0	0	0	0	0x07964132		
RcvBytes	Xmit Pkts	Rcv Pkts	PeerLID	PeerIBPort	PeerPortGUID	PeerPlatformType		
0x1884ac09	0x001afaf4	0x005795e8	16	9	0008f1040040061b	ISR 9288		
PeerModuleType	PeerModuleIndex	PeerPort	PeerName	Status				
sFB-12	4	internal#57	ISR9288-0061b	ALERT				

This example shows the status of the sLB-24 module and its sFB-12 peer Module. Using the Port LID and GUID of each board, you can use the Node Info Window to identify the specific sLB and sFB board and see whether it is defective or not.

To save the fabric statistics file:

- Step 1** From the Fabric Manager main menu, select *Fabric—Fabric Inspect—Settings*.
- Step 2** Specify the name of the statistic file and specify the location where you wish to store the file.
- Step 3** Open the CSV format file with a suitable application (e.g., MS Excel).

Refer to Appendix B.1 for a complete description of ports counters fields, a description of the CSV Summary Report and the port counters currently available in the fabric.

6.4 Additional Tools and Examples

Verification of the fabric is an integral part of running a successful grid.

Below are some troubleshooting examples for common problems that can be found in the fabric.

6.4.1 Detecting and Troubleshooting 1X Cable Width Problems

The system tries to detect the maximum link width between any two end points to optimize performance. If a 1X link is detected, either one of the ports is faulty or the cable is damaged.

A trap is then issued to notify the user about the 1X link, as shown in the example below.

Type	Date/Time	Source	Description	Category	Event ID
Minor	Mon Jul 04 17:56:37 IDT 2005	0008f104004004a8 / sLB-24 4 / Internal Port 10	1x port was found.	Port Counters Error	Osm 1x
Minor	Mon Jul 04 17:55:20 IDT 2005	0008f104004004a8 / sLB-24 4 / Internal Port 10	1x port was found.	Port Counters Error	Osm 1x

Figure 6-5. Trap Table – 1 X Link

To troubleshoot 1X cable width problems:

- Step 1** In the VFM, right-click the trap and select View Event. The following Event Data Information is displayed, showing which ports are connected on both ends with the 1X link:

The Event Data window displays the following information:

Port Info:		Peer Info:	
Node GUID:	0008f104004004a8	Node GUID:	0008f104004004a8
Platform:	ISR 9288	Platform:	ISR 9288
Module:	sLB-24 4	Module:	sFB-12 4
Logical Port:	Internal 10	Logical Port:	7
Port GUID:	0008f104003f0688	Port GUID:	0008f104004004b9
IB Port:	10	IB Port:	7
LID:	8	LID:	18

Close

Figure 6-6. VFM Event Data Window

This trap can be viewed by accessing the Fabric Statistics portcounters.csv file either from the VFM or the CLI.

- Step 2** Reseat both connectors on the 1X link or if this does not fix the problem, proceed to step 3.
- Step 3** Replace the cable that connects between these two ports.

If none of this works, one of the ports may be faulty. In that case, proceed as described below.

If the cable is connected between Host and Switch:

- Step 1** Swap cables and connect the 1X cable to a different port in the switch to verify if the problem remains on the switch port.
- Step 2** If it remains use the second port on the HCA (if available) or use another HCA.
- Step 3** If it remains replace the ISR 9288/9096 Line Board (sLB) or the ISR 9024 Switch, as required.

If the cable is connected between two switches (Switch A and Switch B):

- Step 1** Swap cables on Switch A and connect the 1X cable to a different port in switch A to verify if the problem remains on the switch port.

If the problem is solved, replace the faulty ISR 9288/9096 Line Board (sLB) or the ISR 9024 Switch A.
- Step 2** If it remains swap cables on Switch B and connect the 1X cable to a different port in switch B to verify if the problem remains on the switch port.

If the problem is solved, replace the faulty ISR 9288/9096 Line Board (sLB) or the ISR 9024 Switch B.

6.4.2 Identifying a Bad Line Board or Fabric Board Port

A bad Line Board or Fabric Board port on an ISR 9096/9288 switch can be identified as follows:

- In the Fabric Manager, select the suspected ISR 9096/9288 switch in the topology map of the main window and click the  (Nodes Information) icon on the toolbar.

A separate browser window, as shown in Figure 6-7, opens and displays ISR 9096/9288 node information, the sLB/sFB chip, and the port connection matrix (shows each ISR 9096/9288 external port, internal chip port, and its Channel Adapter connection). It also details the system grouping information.

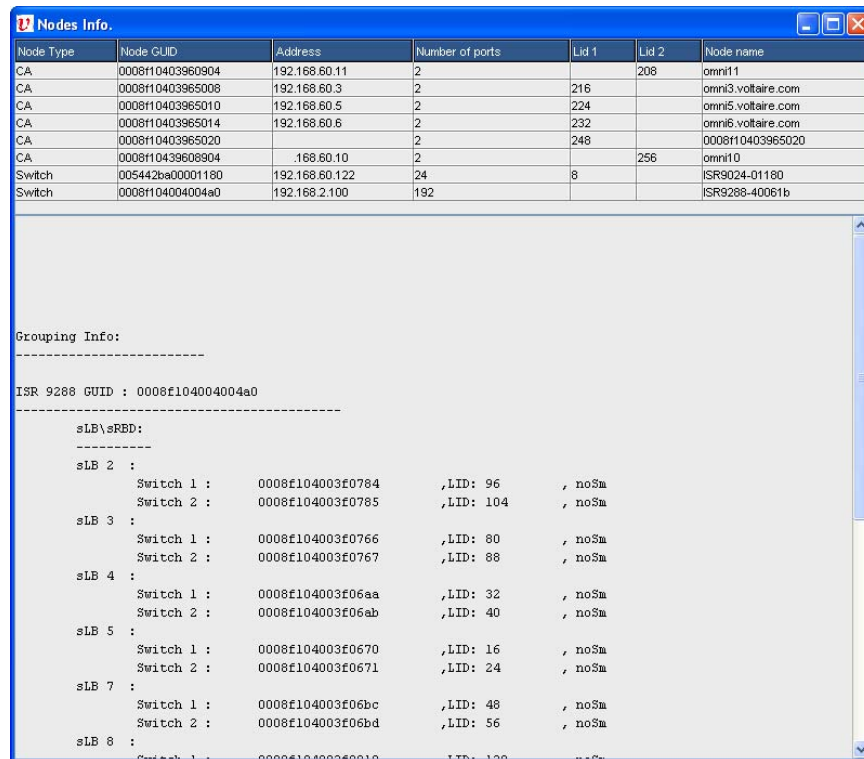


Figure 6-7. Nodes Info Window

This window shows the GUID, LID of the relevant switch, the sLB and sFB board names and their numbers. This window allows the user to find the bad sLB or sFB by LID or GUID.

By combining this node information and portcounters.csv file, one can identify any fabric port connectivity failure that occurred during a pre-configured interval.

The example below shows a portcounters.csv report:

LID	IBPort	PortGUID	NodeType	Width	State	MTU	NumVLs	HOQlife
720	12	0008f104003f0670	Switch	4X	ACTIVE	2048	VL0-VL7	13
PlatformType	ModuleType	ModuleIndex	Port		Name		NodeIP	DeviceID
ISR 9288	sLB-24	5	internal#12		ISR9288-0061b		192.168.60.200	5a09
MLID(#JoinedGroups)		SymErr	LinkRecovers	LinkDowned	RcvErr	RcvRemotePhys		RcvSwitchRelay
0000(#0)		0	0	0	0	0		17575
MLID(#JoinedGroups)		SymErr	LinkRecovers	LinkDowned	RcvErr	RcvRemotePhys		RcvSwitchRelay
0000(#0)		0	0	0	0	0		17575
XmtDiscards		XmtConstraint	RcvConstraint	LocalLinkInteg	ExcessBufOvrrun		VL15Dropped	XmitBytes
1		0	0	0	0		0	0x07964132
RcvBytes		Xmit Pkts	Rcv Pkts	PeerLID	PeerIBPort	PeerPortGUID		PeerPlatformType
0x1884ac09		0x001afaf4	0x005795e8	16	9	0008f1040040061b		ISR 9288
PeerModuleType		PeerModuleIndex	PeerPort	PeerName	Status			
sFB-12		4	internal#57	ISR9288-0061b	ALERT			

This example shows the status of the sLB-24 module and its sFB-12 peer Module. Using the Port LID and GUID of each board, you can use the Node Info Window to identify the specific sLB and sFB board and see whether it is defective or not.

6.4.3 Identifying a Bad Port

A switch port may be considered to be a *bad port* if one of the following conditions occurs.

- It does not respond to NodeInfo
- In the event of duplicate GUIDs

The current status values associated with bad ports are listed below:

1. `BROKEN_LINK`—the physical link on one side is up but the other side is unreachable.
2. `INVALID_LINK`—different connectivity on both sides of the link.
3. `DUPLICATE_HCA_GUID`—another HCA (or switch) with the same GUID as this host.
4. `DUPLICATE_SWITCH_GUID`—another switch with same GUID exists.

Whenever a bad port is detected, the SM sets the port state of the remote port to `Down` and marks it as `Down/Polling` (in the internal fabric database), to indicate that this port is not connected.

This will ensure that bad port shall not be discovered anymore unless the user fixes the problem and clears the bad port table.

To display the bad port table:

- Select *Device—Bad Ports Log* from the Voltaire Device Manager main menu. A browser window is displayed, showing the bad ports.

To clear the bad port table:

This procedure is performed via the CLI:

	Command	Description
Step 1	<code>enable [password]</code>	Enter Privileged mode (from Exec mode).
Step 2	<code>config</code>	Enter Config mode from the Exec mode. Type the password when prompted.
Step 3	<code>sm</code>	Enter Subnet Manager configuration mode.
Step 4	<code># bad-ports-clear set</code>	Clear bad ports table.

NOTE



The Bad Ports feature is disabled by default; this means that by default, the bad ports will not be reported in the CSV file.

To enable the Bad Ports feature, use the `bad-ports-mode set` CLI command in the Subnet Manager submenu under the Config menu.

6.4.4 Some CLI Diagnostic Tools

“zero-counters” script

To clear out all the errors across the fabric, use the “zero-counters” script to traverse the fabric and clear out all the port counters on both the switches and HCAs. This script is very easy to use and is helpful if you want to start off with a “clean” baseline of your fabric after many changes have occurred.

```
ISR9288(utilities) zero-counters
Zero All Counters
lid 1 ports 24
*****
lid 5 ports 24
*****
lid 4 ports 24
*****
lid 3 ports 24
*****
lid 2 ports 24
*****
lid 11 ports 24
*****
....
```

“width-check” script

Another valuable script is the “width-check” script which allows you to easily check the fabric for 1X connections links. While the fabric will work over a 1X connection, it will however create a bottleneck and hurt performance within the fabric. All links should report no 1X connections when the script is ran. Nothing else will be reported other than the LID and GUID if it's a full 4X link.

```
ISR9288(utilities) width-check
Verify / every error found - will be printed
lid 1 guid 0008f104004004d7 ports 24
lid 5 guid 0008f104003f0723 ports 24
lid 4 guid 0008f104003f0722 ports 24
lid 3 guid 0008f104003f071f ports 24
lid 2 guid 0008f104003f071e ports 24
lid 11 guid 0008f104003f0747 ports 24
lid 10 guid 0008f104003f0746 ports 24
lid 7 guid 0008f104003f073b ports 24
```

...

“error-find” script

The easiest way to look for errors on every port in the fabric is to run the “error-find” script. It will report any non-zero port counters found throughout the fabric on both switches and HCAs.

```
ISR9288(utilities) error-find

Show All Counter Errors / every error found - will be printed
  lid 1 guid 0008f104004004d7 ports 24
lid 5 guid 0008f104003f0723 ports 24
  port 22 xmitdiscards:.....4
  port 10 linkdowned:.....1
  port 13 lid 4 guid 0008f104003f0722 ports 24
  port 14 errs.sym:.....83
```



Appendix A CLI Commands Reference

This section provides information about the following CLI topics:

- CLI Usage Tips, on page A-2
- CLI Modes, on page A-2
- Exec Mode, on page A-3
- Privileged Mode, on page A-9
- Configuration (Config) mode, on page A-19

A.1 CLI Usage Tips

- Use the Tab key to complete commands as follows: type in the first one or few letters of the command and then key in Tab; the CLI completes the current word, allowing you to continue entering the command.
- Use the Question Mark (?) key to list all of the options available at that point in the command line.
- Commands and keywords can be truncated at any point after they are unique.
- The CLI is case sensitive. All commands and keywords must be entered in lower case; user-defined strings can appear in any case (including mixed case). Case for user-defined strings is preserved in the configuration.

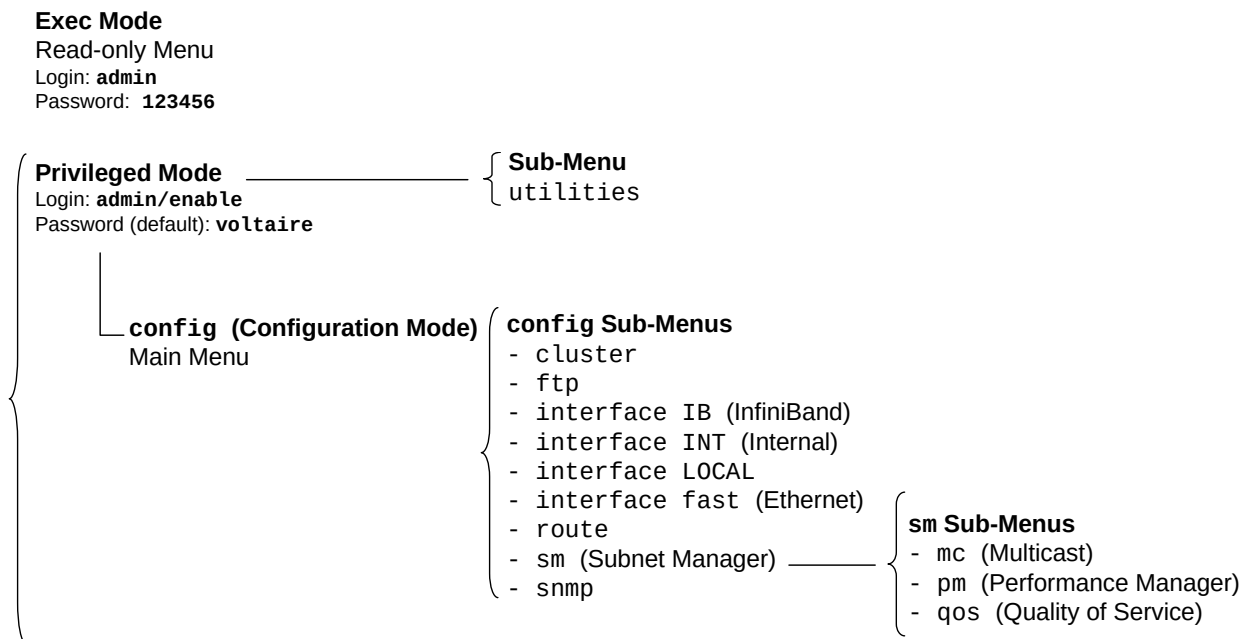
A.2 CLI Modes

There are four CLI modes in the switch: Exec, Privileged, Configuration and Debug. With the exception of the Configuration mode (which can be accessed from Privileged mode), each mode is password-protected. Each mode is easily recognized by the accompanying prompt, listed in .

CLI command mode	Command Prompt	Access Method	Exit Method
Exec	ISRXXXX>	Log in	Use the End command.
Privileged	ISRXXXX#	From Exec mode, type enable.	To go back to Exec mode, type disable or exit . To enter Config mode, type config .
Configuration (Config)	ISRXXXX(config)#	From the Privileged mode, use the config command.	To exit to Privileged mode, use the exit or end command.
Debug	For use by Voltaire personnel only.		

A.3 Voltaire CLI Basic Concept

The Voltaire CLI concept implements a hierarchical organization, as described in the diagram below.



A.4 Exec Mode

When a CLI session is started on the switch, the user enters the Exec mode which allows view-only access of switch configuration parameters.

Exec Mode Commands Reference

The commands available in Exec mode and their descriptions are listed below.

Note: The > prompt shows that you are in Exec Mode.

ISR9096-3009> ?	
?	Display list of available commands
? command	Display command's usage string
clock show	Display the system clock
connect	Connect to IO
enable	Change to PRIVILEGED mode
end	Exit to login menu from any other mode via console connection or close telnet session via telnet connection.
exit	Exit to previous menu
fast-interface show	Show interface Ip address and configuration

firmware show	Display firmware related information
ftp show	Show FTP client configuration
ib-interface show	Show interface IB address and configuration
io show	Show existing IOs
manual-node-names show	Show the nodes in repository.
persistence-state show	Display the state of persistency
ping	Send echo messages.
replication-status show	Display the status of replication
route default-gw show	Show the default Gateway.
sm-info show	Show the sm parameters.
snmp community show	Show the snmp communities.
version show	Display hardware and software version information

The following details the commands available in Exec mode:

Command: ?

Description: Displays a list of available commands in the current CLI mode/menu.

Syntax ?

Command: ? command

Description: Displays brief help text on the specified command

Syntax ? <command>

Command: clock show

Description: Displays the time and date currently set in the switch.

Syntax: clock show

Command: connect

Description: Establishes a CLI session with a router module installed in an ISR 9096/9288 switch.

Syntax: connect [slot-number position-number]

Example: connect 12 2

This command establishes a CLI session with a router module mounted in the sRBD installed in slot 12 of the ISR 9096/9288 rear panel, in the middle router slot.

**NOTE**

The IP address of the router module must be on the same subnet as the SMB card with which the CLI session is established.

Command: enable

Description: Change to Privileged mode

Syntax: enable

Command: end

Description: Exit to login menu from any other mode via console connection, or close Telnet session via Telnet connection.

Syntax: end

Command: exit

Description: Exit to previous menu

Syntax: exit

Command: fast-interface show

Description: Returns the IP address of the Fast interface, its subnet mask, the IP subnet to which the Fast interface broadcasts, and the active management interface (ETH denotes that the Fast interface is the active interface; IB denotes that the IB interface is the active interface).

Syntax: fast-interface show

Example:

```
# fast-interface show
fast ip 172.25.2.206
ip mask is 255.255.0.0
broadcast ip is 172.25.255.255
management interface is eth0:1
```

Command: ftp show

Description: Shows the name of the FTP server and the user name used by the switch to log in to the server. The password is not shown for security reasons.

Syntax: ftp show

Example:

```
SW-6IB4C> ftp show
      ftp configuration
      remote server: ftp.voltaire.com
      user:          voltaire
```

Command: io show

Description: Displays the router modules installed inside the switch; relevant for ISR 9096/9288 switches only. Indicates the slot number on the ISR 9096/9288 rear panel in which the router drawer (sRBD) is installed; indicates the type of router installed in the drawer slots.

Syntax: io show

Example:

```
slot #11, position #3, I/O Type IFC, IP: 172.25.22.41 Mask:
255.255.0.0
```

In this example, an FCR router module is installed in the slot located at the right hand side of the sRBD, itself installed in slot 11 of the ISR 9096/9288 rear panel. Its IP address is 172.25.22.41 and its subnet mask is 255.255.0.0.

Command: persistency state show

Description: Returns the persistency state of the sMB card (to which the CLI session is connected), which can be one of the following: **standalone**, **active** or **standby**. **standalone** indicates that only one sMB card is installed in the chassis. **active** indicates that the sMB card is the primary card; **standby** indicates that the sMB card is in the secondary sMB in a redundant sMB configuration.

Syntax: persistency state show

Command: ping

Description: Continuously pings a specified network host. Press Ctrl-C to stop pinging.

Syntax: ping <IP address>

Example:

```
SW-6IB4C> ping 172.25.0.10
PING 172.25.0.10 (172.25.0.10): 56 data bytes
64bytes from 172.25.0.10: icmp_seq=0 ttl=255 time=1.2 ms
64bytes from 172.25.0.10: icmp_seq=1 ttl=255 time=0.4 ms
64ytes from 172.25.0.10: icmp_seq=2 ttl=255 time=0.4 ms
SW-6IB4C>
172.25.0.10 --- ping statistics---
3packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.4/0.6/1.2 ms
```

Command: replication status show

Description: Returns the replication status of the SMB card (to which the CLI session is connected), which can be one of the following: enabled or disabled. When enabled, the standby SMB maintains a mirror image of the active SMB, and is ready to replace the active SMB in the event of failure. In a redundant SMB configuration, the replication status must be enabled.

Syntax: replication status show

Command: route default-gw show

Description: Returns the default gateway configuration.

Syntax: route default-gw show

Example:

```
SW-6IB4C> route default-gw show
default-gw is:172.25.0.1
```

Command: sm-info show

Description: Returns the current parameter settings of the Subnet Manager in the ISRXXXX.

Syntax: sm-info show

Example:

```
subnet manager info is:
smName= LAVISM
port guid= 0008f1040040061b
topology=CLOS-stage-3
```

```
active topology=CLOS-stage-0
algorithm= balanced-routing
active algorithm= balanced-routing
sm KEY = 0000000000000000
sm priority = 2
sm sweep interval (seconds)= 3600
sm verbosity mode = info
sm topology verbosity = none
sm mads-pipeline = 16
sm polling-retries = 12
sm activity = 20068
sm state = master
sm mode = enable
sm LMC = 1
sm hoq = 13
sm slv = 14
sm mopvl = vl0-3
```

NOTE

Refer to page 3-43 for a description of the Subnet Manager parameters.

Command: snmp community show

Description: Returns the SNMP community strings.

Syntax: snmp community show

Example:

```
SW-6IB4C# snmp community show
           get community public
           set community private
           trap community public
```

Command: version show

Description: Displays software version information.

Syntax: version show

Example:

```
ISR 9288 version: 3.3.0
date:           Feb 10 2005 10:51:52 AM
build Id: 208
```

A.5 Privileged Mode

The Privileged mode command is used to configure basic parameters such as date/time, reload (reset) switch, and to perform software and firmware updates. It also includes all Exec mode commands.

If the system administrator has set a password, you are prompted to enter it before being allowed access to Privileged mode. The password is not displayed on the screen as you enter it and is case sensitive. The system administrator uses the password update [enable] command to set the password that restricts access to privileged mode.

Accessing Privileged Mode

The following example shows how to access Privileged mode:

```
ISRXXXX> enable
Password:xxxxxxx
ISRXXXX#
```

Privileged Mode Commands Reference

The commands available in Privileged mode and their descriptions are listed below.

Note: The # prompt shows that you are in Privileged Mode.

ISR9096-3009#	
?	Display list of available commands
? command	Display command's usage string
alarm clear	Clear Current alarms entry.
alarm clear-all	Clear all Current alarms entry.
alarm show	Show Current alarms.
clock set	Sets a new time.
clock show	Display the system clock
config	Change to configuration mode
debug	Change to debug mode
disable	Change to EXEC mode
end	Exit to login menu from any other mode via console connection or close telnet session via telnet connection.
exit	Exit to previous menu
fast-interface show	Show interface Ip address and configuration
front show	Display the front
ftp show	Show FTP client configuration
sLBPortCounter portReset	Reset sLB port's counter settings
sLBPortCounter reset	Reset sLB port's counter settings

sLBPortCounter show	Show sLB port's counter settings
password update [admin, enable]	Change admin or enable password
persistence-state show	Display the state of persistence
ping	Send echo messages.
qos-info show	show the QoS parameters.
qos-sl-vl show	Show QoS SL-VL Table.
qos-vl-high-arbitration show	Show QoS High Arb. Table.
qos-vl-low-arbitration show	Show QoS Low Arb. Table.
rear show	Display the rear
reload	Reboots the system.
replication-status set	Change the status of replication
replication-status show	Display the status of replication
route default-gw show	Show the default Gateway.
sm-info show	Show the sm parameters.
snmp community show	Show the snmp communities.
update firmware	Update firmware version.
update software	Update software version. Add remote server name via 'ftp server [server-name]'
utilities	Change to utilities mode
version show	Display hardware and software version information

Syntax usage is as follows in Privileged mode Menu:

alarm clear	alarm clear [entry]
alarm clear-all	alarm clear-all
alarm show	alarm show
clock set	clock set MMDDhhmmYYYY
clock show	clock show
config	config
debug	debug
disable	disable
fast-interface show	fast-interface show
front show	front show
ftp show	ftp show
sLBPortCounter portReset	devicePortCounter portReset [slot #] [port-number]
sLBPortCounter reset	devicePortCounter reset [slot #]
sLBPortCounter show	sLBPortCounter show [slot #]
password update [admin, enable]	password update [admin, enable]
persistence-state show	persistence-state show
qos-info show	qos-info show
qos-sl-vl show	qos-sl-vl show
qos-vl-high-arbitration show	qos-vl-high-arbitration show
qos-vl-low-arbitration show	qos-vl-low-arbitration show
rear show	rear show
reload	reload
replication-status set	replication-status set
replication-status show	replication-status show
route default-gw show	default-gw show
sm-info show	sm-info show
snmp community show	snmp community show
update firmware	update firmware [update-file-

update software	dir]
utilities	update software [update-file-
version show	dir]
	utilities
	version show

The following details the commands available in Privileged mode:

Command: alarm clear

Description: Clears the current alarm stored in the alarm buffer.

Syntax: alarm clear [entry]

Command: alarm clear-all

Description: Clears all current alarms stored in the alarm buffer.

Syntax: alarm clear-all

Command: alarm show

Description: Displays a list of the current alarms in the switch alarm buffer. Each alarm is listed with its alarm severity, alarm type and the object where the alarm has occurred.

Syntax: alarm show

Example:

```
ISR9XXX# alarm show
1 minor Port-Counter 0008f104004006f8, "ISR 9288" sLB-24 11 internal
port 19
22/02/2005 16:21:13 32 Link-Error-Recovery
2 minor Port-Counter 0008f104004006f8, "ISR 9288" sFB-12 1 port 63 2
```

Command: clock set

Description: Sets the time and date registered at the switch in military time format. The time and date will appear in relevant reports in GUI-based management systems.

Syntax: clock set MMDDhhmmYYYY

Command: clock show

Description: Displays the time and date currently set in the switch.

Syntax: clock show

Command: config

Description: Changes to the Configuration mode, which allows the user to configure all switch configuration parameters.

Syntax: config

Command: debug

Description: Changes to Debug mode, which is intended for the use of Voltaire personnel only.

Syntax: debug

Command: disable

Description: Changes to Exec mode, which allows view-only access of the switch configuration parameters,

Syntax: disable

Command: fast-interface show

Description: Returns the IP address of the Fast interface, its subnet mask, the IP subnet to which the Fast interface broadcasts, and the active management interface (ETH denotes that the Fast interface is the active interface; IB denotes that the IB interface is the active interface).

Syntax: fast-interface show

Example:

```
# fast-interface show
fast ip 172.25.2.206
ip mask is 255.255.0.0
broadcast ip is 172.25.255.255
management interface is eth0:1
```

Command: front show

Description: Displays a list of the modules installed on the front panel of an ISR 9096/9288 switch, including the hardware version and serial number of the module.

Syntax: front show

Example:

```
Device: HW Version is "AAA"; Serial Number is "DDDD12345678"
```

```
SFB #1: HW Version is "ASD"; Serial Number is "ASDF12345678"
SFB #4: HW Version is "AAA"; Serial Number is "AARM32040006"
sMb: HW Version is "AAA"; Serial Number is "AAAA12345678"
sFU8: HW Version is "BAA"; Serial Number is "AAQG38040009"
sFU4: HW Version is "BAA"; Serial Number is "AAQH38040011"
```

Command: ftp show

Description: Shows the ftp client configuration

Syntax: ftp show

Example:

```
ftp configuration
-----
remote server: 172.25.0.16
user:          swget
ISR9096-3009#
```

Command: sLBPortCounter portReset

Description: Resets sLB port's counter/settings

Syntax: devicePortCounter portReset [slot #] [port-number]

Command: sLBPortCounter reset

Description: Resets counters of specific sLB ports

Syntax: devicePortCounter reset [slot #]

Command: sLBPortCounter show

Description: shows all the external sLB port counters displayed in a table. This allows the user to quickly detect counter errors during connection of nodes.

Syntax: sLBPortCounter show [slot #]

Command: password update

Description: Change admin or enable password

Syntax: password update [admin, enable]

Example: The following is a step-by-step example of how to update the Privileged mode (Enable) password:

1. Type password update enable. The following message is displayed.
Insert new (8 characters) password:
2. Type in the new password ; for example: password . The following message is displayed.

Please retype new password:for example:
password.

3. Retype the password identically to the previous step; the following message is displayed.

OK

Command:	<code>persistency-state show</code>
Description:	Displays the state of persistency. Shows if the sMB acts as a master, standalone or standby. There can be two sMB modules plugged into the system. This command shows the current state of the sMB module. Only one sMB can act as a master at given time, the other sMB, if installed is in standby mode continuously monitoring the active sMB.

Syntax:	<code>persistency-state show</code>
---------	-------------------------------------

Command:	<code>ping</code>
Description:	sends echo messages
Syntax:	<code>ping</code>

Command:	<code>qos-info show</code>
Description:	Displays the QoS parameters set for the switch. For more information regarding QoS arbitration, see page 3-46.
Syntax:	<code>qos-info show</code>

Example:

```
QoS info is:
qos-vl-high-arbitration-limit = 0
qos-configuration-enable = enable
qos-apply-configuration = no
```

Command:	<code>qos-sl-vl show</code>
Description:	Displays the QoS SL-VL table. For more information regarding QoS arbitration, see page 3-46.
Syntax:	<code>qos-sl-vl show</code>

Example:

```
entry sl vl
---|---|-----|
1  0    0
2  1    1
3  2    2
4  3    3
5  4    4
6  5    5
```

```

7 6 6
8 7 7
9 8 8
10 9 9
11 10 10
12 11 11
13 12 12
14 13 13
15 14 14
16 15 7

```

Command: qos-vl-high-arbitration show

Description: Displays the QoS High Arbitration table. For more information regarding QoS arbitration, see page 3-46.

Syntax: qos-vl-high-arbitration show

Example:

```

entry vl weight
---|---|-----|
1 0 4
2 1 0
3 2 0
4 3 0
5 4 0
6 5 0
7 6 0
8 7 0

```

Command: qos-vl-low-arbitration show

Description: Displays the Quality of Service (QoS) Low Arbitration table. For more information regarding QoS arbitration, see page 3-46.

Syntax: qos-vl-low-arbitration show

Example:

```

entry vl weight
|-----|---|---
1 0 0
2 1 4
3 2 4
4 3 4
5 4 4
6 5 4
7 6 4
8 7 4

```

Command: rear show

Description: Displays a list of the modules installed on the rear panel of an ISR 9096/9288 switch, including the hardware version and serial number of the module.

Syntax: rear show

Example:

```
Line in slot #3: HW Version is "AAI"; Serial Number is
"AAPV30040014"
Line in slot #5: HW Version is "GGG"; Serial Number is
"GGGG12345678"
Line in slot #6: HW Version is "AAI"; Serial Number is
"AAPV43040007"
Line in slot #9: HW Version is "AAI"; Serial Number is
"AAPV43040075"
IO Drawer in slot #11: HW Version is "AAD"; Serial Number is
"AARM44040006"
```

Command:	reload
Description:	Reboots the switch; this command is required after performing various operations in order for configuration changes to become effective.

Syntax:	reload
---------	--------

Command:	replication-status set
Description:	Enable or disable SMB replication. When enabled, the standby SMB maintains a mirror image of the active SMB, and is ready to replace the active SMB in the event of failure. In a redundant SMB configuration, the replication status must be enabled.

Syntax:	replication-status set [enable, disable]
---------	--

Command:	replication-status show
Description:	Shows the status of the SMB replication (enabled or disabled). When enabled, the standby SMB maintains a mirror image of the active SMB and is ready to replace the active SMB in the event of failure. In a redundant SMB configuration, the replication status must be enabled.

Syntax:	replication-status show
---------	-------------------------

Command:	route default-gw show
Description:	Returns the default gateway configuration.
Syntax:	route default-gw show

Example:

```
SW-6IB4C> route default-gw show
default-gw is:172.25.0.1
```

Command:	sm-info show
Description:	Returns the current parameter settings of the Subnet Manager in the ISRXXXX.

Syntax: `sm-info show`

Example:

```
subnet manager info is:
smName= LAVISM
port guid= 0008f1040040061b
topology=CLOS-stage-3
active topology=CLOS-stage-0
algorithm= balanced-routing
active algorithm= balanced-routing
sm KEY = 0000000000000000
sm priority = 2
sm sweep interval (seconds)= 3600
sm verbosity mode = info
sm topology verbosity = none
sm mads-pipeline = 16
sm polling-retries = 12
sm activity = 20068
sm state = master
sm mode = enable
sm LMC = 1
sm hoq = 13
sm slv = 14
sm mopvl = vl0-3
```

NOTE



Refer to page 3-43 for a description of the Subnet Manager parameters.

Command: `snmp community show`

Description: Returns the SNMP community strings.

Syntax: `snmp community show`

Example:

```
SW-6IB4C# snmp community show
      get community  public
      set community  private
      trap community public
```

Command: `update firmware`

Description: Updates the firmware version, using the firmware located in the specified directory of the designated FTP server.

Syntax: `update firmware [update-file-dir]`

NOTE



This command is only applicable for ISR 9096/9288 and ISR 9024 switches.

Command: update software

Description: Updates the software version, using the software located in the specified directory of the designated FTP server.

Syntax: update software [update-file-dir]

NOTE

In ISR 6000 switches, this command also updates the firmware of the switch.

Command: utilities

Description: changes to utilities menu (see Utilities Menu, Section 0 for additional information)

Syntax: utilities

Command: version show

Description: Displays hardware and software version information

Syntax: SW-6IB4C> version show

Example: SW-6IB4 version: 1.5.09, Aug 28 2003
07:44:04PM

Utilities Menu

This menu provides advanced scripts and utilities enhancing current diagnostic features and adding diagnostic functionality.

```
ISR9096-3009# (utilities)
?                               Display list of available commands
? command                       Display command's usage string
end                             Exit to login menu from any other mode via
                               console connection or close telnet session
                               via telnet connection.

error-find                     Perform error-find command
event-log show                 Show event log file
exit                           Exit to previous menu
find_bad_ports                 Perform find_bad_ports command
findpath                       Perform findpath command
getpathrecord                  Perform getpathrecord command
lidtrace                       Perform lidtrace command
linux-log show                 Show log file
madstat                        Perform madstat command
mcmember                       Perform mcmember command
mctrace                        Perform mctrace command
netdiscover                    Perform netdiscover command
setpkey                        Perform setpkey command
sminfo                         Perform sminfo command
smpdump                        Perform smpdump command
smpex                          Perform smpex command
topology-log show              Show log file
vendstat                       Perform vendstat command
vsm-log show                   Show log file
width-check                    Perform width-check command
zero-counters                  Perform zero-counters command
```

Utilities syntax usage is as follows:

```
error-find                     error-find -h
                               usage : /usr/voltaire/scripts/debug/error-
                               find.sh [OPTIONS]
event-log show                 event-log show
find_bad_ports                 find_bad_ports find_bad_ports -h' for
                               help (DISABLED)
findpath                       findpath 'findpath --help' for help
                               Usage: findpath [-d(ebug)] -v(erbose) -
                               s(imple) -f(astmode)[-t timeout_ms]
                               <portguid>
getpathrecord                  getpathrecord [-d(ebug)] [-p gid_prefix]
                               [-s smlid] [-t timeout_ms] <srcguid>
                               <destguid> [<npaths>]
lidtrace                       lidtrace [-d(ebug)] [-D(irect)src] -
                               v(erbose) -s(imple)[-t timeout_ms] <src-
                               lid> <dest-lid>
linux-log show                 linux-log show
madstat                        madstat [-d] [-D(irect)] [-t timeout_ms]
                               [-i sampling_intrval_ms] [-w stat_window]
                               <Switch|Port|smA|Counters|Forcets|Monitor|
                               cuTthough|vlmask|eXt_portset|Up
                               |sl_vl_mappinG|Vl_arbitration> <lid|path>
```

	[port] [ts_type] [inport] [block] (for further detail, refer to the madstat section on page A-24)
mcmember	mcmember [-d(ebug)] [-t timeout_ms] [-s scope] [-m mgid] [-p portguid] [-pro(x)y] < [-j(oin)] [-g(et)] [-l(eave)] >
mctrace	mctrace [-d(ebug)] [-D(irect)src] -v(erbos)e -s(imple)[-t timeout_ms] <mlid> <src-lid> <dest-lid>
netdiscover	netdiscover [-d(ebug)] -v(erbos)e -s(how) -t timeout_ms] [<netfile>]
setpkey	setpkey [-d(ebug)] [-D(irect)] [-p port] [-t timeout_ms] <path lid> [<pkey-entry ...>]
sminfo	sminfo [-d(ebug)] [-s state] [-p prio] [-a activity] [-D(irect)] [-t timeout_ms] <sm lid sm path>
smpdump	smpdump [-d(ebug)] [-s(tring)] [-x(hex)] [-b(binary data)] [-D(irect)] [-t timeout_ms] <dest> <attrid> [mod]
smplex	smplex [-d(ebug) -s(tring_data) -v(erbos)e] -a(ttr) -m(od) -D(irect)] [-t timeout_ms] <dlid path> <num> [win]
topology-log show	topology-log show
vendstat	vendstat [-d] [-t timeout_ms] <Gpio iNfo portCause Perormance> <lid> [args...]
vsm-log show	vsm-log show
width-check	./width-check.sh [lid or nothing = pass on all fabric]
zero-counters	/usr/voltaire/scripts/debug/zero-counters.sh [-m counter_mask] [-u uniq_lid] [-h]

The following details the commands available in the Utilities Menu.

Command:	error find
Description:	Quick track of Port Counters errors on all fabric. All HCA ports are scanned and the errors found are displayed in a table.
Syntax:	error find
Usage:	error-find [OPTIONS] (error-find -h' for help)

Options

[-u uniq_lid]	- Scan only uniq_lid
[-f]	- Include a dump of flow counters
[-t]	- Print output as a text (without colours)
[-H]	- Scan HCAs only
[-S]	- Scan Switches only

Output:

```
Scan All Counters
Hca 2 H-0008f100010c0000 Voltaire IB-to-TCP/IP Router
Hca 2 H-0008f10403965224 Voltaire HCA400
[1] LID 32 --- S-0008f104003f06c1[22]
alert-> errs.sym:.....73
alert-> linkrecovers:.....1
alert-> linkdowned:.....8
```

Human translation:

All HCA ports are scanned. One HCA port displays a problem.

Conclusion:

Try to reset this port and retry to run the test.

Hint:

There could be a counter increment just after cable plug in, so reset the counters and follow-up.

Known bugs or limitations: none.

Command: `event-log show`

Description:	Shows the Voltaire Fabric Management event log file
--------------	---

Syntax: `event-log show`

Example:

```
ISR9XXX(utilities) event-log show
Jul 13 09:49:55 0 vsm[414]: CREATE MC GROUP: MGID
ff12401bfffff0000000000000ffffffffff
Jul 13 09:49:56 0 vsm[414]: SM STATE CHANGE: Entering SM
Discovering State
Jul 13 09:49:56 0 vsm[440]: SM STATE CHANGE: Entering SM
Master State
Jul 13 09:49:56 0 vsm[440]: 0008f104003f074e,      port 22 -
1X port was found [ Port-GUID 8f104003f074e IB Port 22. Peer
at: 0008f104003f074e,      port 24 Port-GUID 8f104003f074e IB
Port 24. ]
Jul 13 09:49:56 0 vsm[440]: 0008f104003f074e,      port 24 -
1X port was found [ Port-GUID 8f104003f074e IB Port 24. Peer
at: 0008f104003f074e,      port 22 Port-GUID 8f104003f074e IB
Port 22. ]
```

Command: find_bad_ports

Description: Detects bad links/ports. Allows to pinpoint defective Fabric and peer ports.

Syntax: find_bad_ports

Example:

find_bad_ports

Output:

```
Found bad link/port:
node_guid:.....0008f1040040061a
node_desc:.....'ISR9288 Voltaire sFB-12'
lid:.....23
smlid:.....1
Port 23
direct path from self switch: 0,18,11 23
Found bad link/port:
node_guid:.....0008f10400400706
node_desc:.....'ISR9288 Voltaire sFB-12'
lid:.....26
smlid:.....1
Port 23
direct path from self switch: 0,18,2 23
```

Human translation:

There are two fabric ports whose peers are not responding.

Conclusion:

In both cases, something connected to the sFB is not responding –it could either be sLB, the IPR or the GER.

If it is the sLB, try to remove and insert the sLB. A device is probably set in continuous reset .

If the IPR/GER are causing the problem, verify that the module (and sRBD) is correctly plugged-in.

After a power cycle, it is also possible that modules are still not UP.

Hint:

After power cycle wait 4-6 minutes until all modules are UP, then run a script.

Known bugs or limitations: none.

Command: findpath

Description: Prints port path between two nodes

Syntax: findpath [-d(efug)] -v(erbose) -s(imple) -f(astmode)[-t timeout_ms] <portguid>

Example:

Example : findpath 0x8f104039651cd

Output :

[0][3][15][2]

Human translation:

- 1) Pkt. transmitted from CPU,
- 2) Entered first ANAFA chip via port 0 ,
- 3) Transmitted from ANAFA via port 3 ,
- 4) Entered second ANAFA chip transmitted from ANAFA via port 15,
- 5) Entered third ANAFA chip transmitted from ANAFA via port 2.

Conclusion : on the requested path 3 ANAFA chips + one entity (voltaire HCA - see guid range)

Command: getpathrecord

Description: Checks the existence of a path between nodes

Syntax: getpathrecord [-d(efug)] [-p gid_prefix] [-s smlid] [-t timeout_ms] <srcguid> <destguid> [<npaths>]

Command: lidtrace

Description: Print LID route path between two nodes (unicast path only)

Syntax: lidtrace [-d(efug)] [-D(irect)src] -v(erbose) -s(imple)[-t timeout_ms] <src-lid> <dest-lid>

Example:

lidtrace 24 22

Output:

```
From hca {0008f10403962e24} portnum 1 lid 0x18-0x18 "Voltaire
HCA400"
[1] -> switch port {0008f104003f07d9}[16] lid 0xb-0xb
"ISR9288 Voltaire sLB-24"
[14] -> hca port {0008f10403962741}[1] lid 0x16-0x16
"Voltaire HCA400"
To hca {0008f10403962740} portnum 1 lid 0x16-0x16 "Voltaire
HCA400"
```

Human translation:

A unicast path exists between the portLID 24 (which is local port 1) and portLID22 (which is local port 1).

Path descr. : HCA_p1→p16_ANAFA_p14→p1_HCA

Conclusion : Unicast tables configured (at least for this LIDs)

Hint : Always verify that the opposite path exist as well .

Known bugs or limitations: none

Command: linux-log show

Description: Shows linux log file (var/log/messages)

Syntax: linux-log show

Command: madstat

Description: retrieves various information from the IB Fabric with LID/DIRECT routed MADs.

Syntax: madstat [-d] [-D(irect)] [-t timeout_ms] [-i sampling_intrval_ms] [-w stat_window]
<Switch|Port|smA|Counters|Forcets|Monitor|cuTt
hough|vlmask|ext_portset|Up|sl_vl_mappinG|vl_a
rbitration> <lid|path> [port] [ts_type]
[inport] [block]

General options:

```
[-d] increase debug level (default 0)
[-D] use direct route SMP (default lid route)
[-g guid] dest GUID
[-p guid] dest GID prefix
      Direct path format: <port0,port1,port2,...>
[-t timeout_ms] set RPC timeout value per retry in msec
                  (default 200)
[-r retries] set retries number (default 3)
              Default port is 0
```

Usage formats:

```
madstat S <lid|path> - Get Switch settings
madstat N <lid|path> - Get Node settings
madstat P <lid|path> [<port>] - Get Port settings
madstat X <lid|path> [<port>] - Get Advanced port settings
madstat A <lid|path> - Get smA port settings
madstat C <lid|path> [<port>] - Get port Counters
madstat D <lid|path> [<port>] - Mtl Get port Counters
madstat Z <lid|path> [<port>] [mask] - Zero port Counters
(with counter mask)
madstat E <lid|path> [<port>] - Get EXT.port Counters
madstat R <lid|path> [<port>] [mask] - Zero EXT.port Counters
(with counter mask)
```

Conclusion : very useful utility to test SM abilities to create MCgr and to mass config of MC FDB

Hint :

if `-m` option is not specified , then default MCgr is used -

0xFF12401BFeFF000000000000FFFFFFFF

if `-p` option is not specified , then self port (portguid of connected to CPU anafa) is used .

Known bugs or limitations: none

Command: mctrace

Description: Finds multicast (port) path between nodes. MC FDB searches from port to port. Useful to test SM abilities to configure MC FDB (multi-cast forwarding tables)

Syntax: mctrace [-d(ebug)] [-D(irect)src] -v(erbose) -s(imple)[-t timeout_ms] <mlid> <src-lid> <dest-lid>

Example:

```
mctrace 0xc000 22 24
```

Output:

```
From hca 0x8f10403962740 port 1 lid 0x16-0x16 "Voltaire HCA400"
[1] -> switch 0x8f104003f07d9[14] lid 0xb "ISR9288 Voltaire SLB-24"
[16] -> hca 0x8f10403962e24[1] lid 0x18 "Voltaire HCA400"
To hca 0x8f10403962e24 port 1 lid 0x18-0x18 "Voltaire HCA400"
```

Human translation:

A multicast path (for mLID 0xc000) exists between portLID 22 and portLID 24

Conclusion: portLID 24 joined the MCgroup 0xc000.

Hint: always check the opposite path

Known bugs or limitations: none.

Command: netdiscover

Description: Dumps net configuration (for debug or development purposes)

Syntax: netdiscover

Example:

```
(utilities) netdiscover
#
# Topology file: generated on Thu Jul 14 19:11:06 2005
#
switchguids=0x8f10400403009
```

```

Switch 24 "S-0008f10400403009" # ISR9096 Voltaire
sFB-4 smalid 1
[22] "S-0008f104003f0765"[1]
[19] "S-0008f104003f0764"[1]
[10] "S-0008f104003f074f"[1]
[7] "S-0008f104003f074e"[1]
[2] "H-0008f100010c0000"[1]

switchguids=0x8f104003f0765
Switch 24 "S-0008f104003f0765" # ISR9288/ISR9096
Voltaire sLB-24 smalid 9
[24] "S-0008f104003f074f"[23]
[22] "S-0008f104003f074f"[15]
[17] "S-0008f104003f074e"[16]
[10] "S-0008f10400403002"[22]
[4] "S-0008f1040040300e"[22]
[1] "S-0008f10400403009"[22]

switchguids=0x8f104003f0764
Switch 24 "S-0008f104003f0764" # ISR9288/ISR9096
Voltaire sLB-24 smalid 8
[21] "S-0008f104003f0764"[19]
[19] "S-0008f104003f0764"[21]
[10] "S-0008f10400403002"[19]
[4] "S-0008f1040040300e"[19]
[1] "S-0008f10400403009"[19]

switchguids=0x8f104003f074f
Switch 24 "S-0008f104003f074f" # ISR9288/ISR9096
Voltaire sLB-24 smalid 7
[24] "S-0008f104003f074f"[22]
[22] "S-0008f104003f074f"[24]
[10] "S-0008f10400403002"[10]
[4] "S-0008f1040040300e"[10]
[23] "S-0008f104003f0765"[24]
[15] "S-0008f104003f0765"[22]
[1] "S-0008f10400403009"[10]

switchguids=0x8f104003f074e
Switch 24 "S-0008f104003f074e" # ISR9288/ISR9096
Voltaire sLB-24 smalid 6
[24] "S-0008f104003f074e"[22]
[22] "S-0008f104003f074e"[24]
[10] "S-0008f10400403002"[7]
[4] "S-0008f1040040300e"[7]
[16] "S-0008f104003f0765"[17]
[1] "S-0008f10400403009"[7]

switchguids=0x8f10400403002
Switch 24 "S-0008f10400403002" # ISR9096 Voltaire
sFB-4 smalid 10
[2] "H-0008f100010c0000"[2]
[7] "S-0008f104003f074e"[10]
[10] "S-0008f104003f074f"[10]
[19] "S-0008f104003f0764"[10]

```

```
[22]      "S-0008f104003f0765"[10]

switchguids=0x8f1040040300e
Switch  24 "S-0008f1040040300e"          # ISR9096 Voltaire
sFB-4 smalid 11
[7]      "S-0008f104003f074e"[4]
[10]     "S-0008f104003f074f"[4]
[19]     "S-0008f104003f0764"[4]
[22]     "S-0008f104003f0765"[4]

hcaguids=0x8f100010c0000
Hca      2 "H-0008f100010c0000"          # Voltaire InfiniBand
Fiber-Channel Router
[2]      "S-0008f10400403002"[2]          # lid 5 lmc 0
[1]      "S-0008f10400403009"[2]          # lid 4 lmc 0
```

Command: setpkey

Description: for development purposes only

Syntax: setpkey [-d(ebug)] [-D(iirect)] [-p port] [-t timeout_ms] <path|lid> [<pkey-entry ...>]

Command: sminfo

Description: Print info on specific subnet manager state. The sminfo utility retrieves subnet manager related information from the IB fabric using LID and direct routed MADs. This information includes: subnet manager GUID, activity count, priority and state.

Syntax: sminfo [-d(ebug)] [-s state] [-p prio] [-a activity] [-D(iirect)] [-t timeout_ms] <sm lid|sm path>

Example:

```
#sminfo -D 0
sminfo: sm guid 8F104000B, activity count 13507 priority 3
state SMINFO_MASTER 3

#sminfo 1
sminfo: sm guid 8F104000B, activity count 13508 priority 3
state SMINFO_MASTER 3
```

_sminfo` Detailed Description:

A LID routed MAD is sent to a specific LID in the fabric. For example:

“sminfo 1” queries the subnet manager state of the node element corresponding to LID 1 in the fabric. That should work only if the fabric is configured and the node element in the fabric whose LID is assigned to 1 is indeed a subnet manager.

A direct routed MAD is sent to a node element in the fabric that corresponds to the specified direct-path.

A direct routed mad can work in a fabric that is not configured.

A path is specified using the following format: <port0,port1, port2, ...>.

The path is relative to the SW-6IB4C on which *sminfo* is running.

For example, “*sminfo -D <1,7>*” is executed as follows:

queries the subnet manager state of the node element which corresponds the direct path <1,7>

Follow the direct path: start at element 0, which is our 8 port SW-6IB4C.

Go out of port 1 of element 0. Reach element 1 which is connected to that port.

Go out of port 7 of element 1 (assuming that element 1 has a valid and connected port 7). Reach element 2 which is connected to that port.

The direct path <1,7> led us to element 2. The corresponding MAD will retrieve the required data from the element, provided this is a subnet manager element.

Command: smpdump

Description: The smpdump utility retrieves information from the IB fabric using LID routed MADs and direct routed MADs. smpdump is available from the root shell of the ISR 9096/9288.

Syntax: smpdump [-d(ebug)] [-s(string)] [-x(hex)] [-b(binary data)] [-D(direct)] [-t timeout_ms] <dest> <attrid> [mod]

Subnet Management Attributes		
AttributeName	AttrId	AttrModifier
=====		
Notice	2	0
NodeDescription	16	0
NodeInfo	17	0
SwitchInfo	18	0
GUIDInfo	20	GUID Block
PortInfo	21	Port Number
P_KeyTable	22	Port Number/P_Key block
SLtoVLMMappingTable	23	Input/Output Port Number
VLArbtrationTable	24	Output Port/Component
LinearFwdTable	25	Block Identifier
RandomFwdTable	26	Block Identifier
MulticastFwdTable	27	Block Identifier
SM Info	32	0 - 5
VendorDiag	48	0 - 0xFFFF
LedInfo	49	0

Detailed Description:

A LID routed MAD is sent to a specific LID in the fabric. For example:

“*smpdump* 1 25” retrieves the first block of the linear forwarding table (attribute id 25; the attribute modifier is implicitly 0 meaning the first block) of the switch corresponding to LID 1 in the fabric. That should work only if the fabric is configured and the node element in the fabric whose LID is assigned to 1 is indeed an IB switch.

A direct routed MAD is sent to a node element in the fabric that corresponds to the specified direct-path.

A direct routed mad can work in an non configured fabric.

A path is specified using the following format: <port0,port1, port2, ...>.

The path is relative to the SW-6IB4C on which *smpdump* is running.

For example, “*smpdump -D <1,7> 27*” is executed as follows:

Retrieve the first block of the multicast forwarding table (attribute id 27; attribute modifier is implicitly 0) of the switch element which corresponds the direct path <1,7>

Follow the direct path: start at element 0, which is our 8 port SW-6IB4C.

Go out of port 1 of element 0. Reach element 1 which is connected to that port.

Go out of port 7 of element 1 (assuming that element 1 has a valid and connected port 7). Reach element 2 which is connected to that port.

The direct path <1,7> led us to element 2. The corresponding MAD will retrieve the required data from the element, provided this is a switch element.

Command: `smpex`

Description: `smpex` is a powerful tool to create MAD traffic to specified node/port. `smpex` is available from the root shell or the ISR 9096/9288.

Syntax: `smpex [-d(ebug) -s(tring_data) -v(erbose) -a(ttr) -m(od) -D(irect)] [-t timeout_ms] <dldid | path> <num> [win]`

Subnet Management Attributes

AttributeName	AttrId	AttrModifier
=====		
Notice	2	0
NodeDescription	16	0
NodeInfo	17	0
SwitchInfo	18	0
GUIDInfo	20	GUID Block
PortInfo	21	Port Number
P_KeyTable	22	Port Number/P_Key block
SLtoVLMappingTable23	Input/Output	Port Number
VLArbitrationTable	24	Output Port/Component

```

LinearFwdTable      25    Block Identifier
RandomFwdTable      26    Block Identifier
MulticastFwdTable   27    Block Identifier
SM Info             32    0 - 5
VendorDiag          48    0 - 0xFFFF
LedInfo             49    0
Example :  smpex -a 18 -D 0,8 992 16

```

Output:

```

## start: win 16 direct route path 0,8 attr 18 mod 0
## END: total sent 992 replied 992 resend 0 err 0 ms 119 avg
ms 0.12

```

Command: topology-log show

Description: shows the topology log file.

Syntax: topology-log show

Command: vendstat

Description: vendor specific MAD generator

Syntax: vendstat [-d] [-t timeout_ms]
<Gpio|iNfo|portCause|Perormance> <lid>
[args...]

General options:

```

[-d] increase debug level (default 0)
[-t timeout_ms] set RPC timeout value per retry in msec
(default 200)
[-r retries] set retries number (default 3)

```

Usage formats:

```

vendstat G <lid> - Get GPIO Data
vendstat N <lid> - Get IS3 General Info
vendstat C <lid> - Get IS3 Port Cause Bits
vendstat P <lid> <port> - Get Port Performance Counters

```

Command: vsm-log show

Description: shows Voltaire Subnet Manager Log

Syntax: vsm-log show

Command: width-check

Description: Checks if 1x ports exist in fabric

Syntax: width-check

Example:

```

ISR9XXX(utilities)width-check
Verify / every error found - will be printed
lid 1 guid 0008f10400403009 ports 24

```

```
lid 9 guid 0008f104003f0765 ports 24
port 22 width:.....1X
lid 8 guid 0008f104003f0764 ports 24
port 19 width:.....1X
port 21 width:.....1X
lid 7 guid 0008f104003f074f ports 24
port 15 width:.....1X
lid 6 guid 0008f104003f074e ports 24
port 22 width:.....1X
port 24 width:.....1X
lid 10 guid 0008f10400403002 ports 24
lid 11 guid 0008f1040040300e ports 24
lid 5 guid 0008f100010c0000 ports 2
lid 4 guid 0008f100010c0000 ports 2
```

Command: zero-counters

Description: Utility that allows to zero system counters

Syntax: zero-counters
zero port counters of [one / all / hca only /
sw only] node/s

Example:

```
ISR9XXX(utilities) zero-counters
Zero All Counters
Zero lid 1 port 255 mask 0xffff
Zero lid 9 port 255 mask 0xffff
Zero lid 8 port 255 mask 0xffff
Zero lid 7 port 255 mask 0xffff
Zero lid 6 port 255 mask 0xffff
Zero lid 10 port 255 mask 0xffff
Zero lid 11 port 255 mask 0xffff
Zero lid 5 port 2 mask 0xffff
Zero lid 4 port 1 mask 0xffff
```

A.6 Configuration (Config) Mode

Configuration mode commands apply to system-wide features, rather than a specific protocol or interface. From Config mode, you can access other CLI menus for configuration of specific system features, protocols and interfaces. Available commands for each are described under their respective sub-topics.

Accessing Config Mode

The Config mode is entered through Privileged mode by typing the config command.

Config Mode Commands Reference

A list of the commands available and their descriptions in the Configuration mode are listed in the following pages.

ISR9096-3009(config)# ?	?
?	Display list of available commands
? command	Display command's usage string
cluster	Change to Cluster configuration mode
end	Exit to login menu from any other mode via console connection or close telnet session via telnet connection.
exit	Exit to previous menu
factory-default	Switch back to factory default, and reboot system.
ftp	Change to ftp configuration mode
interface IB	Change to IB interface configuration mode.
interface INT	Change to INT interface configuration mode.
interface LOCAL	Change to LOCAL interface configuration mode.
interface fast	Change to fast interface configuration mode
ping	Send echo messages.
remote-logger delete	Delete the remote-logger of this computer.
remote-logger set	Set the remote-logger of this computer.
remote-logger show	Show the remote-logger of this computer.
route	Change to route configuration mode
sm	Change to sm configuration mode
snmp	Change to snmp configuration mode
system-name set	Set the system name of this computer.
system-name show	Show the system name of this computer.
watchdog mode set	Enable or disable Watchdog.
watchdog mode show	Show Watchdog Mode.
watchdog timeout show	Show Watchdog Timeout.

Config syntax usage is as follows:

cluster	cluster
factory-default	factory-default
ftp	ftp
interface IB	interface IB
interface INT	interface INT
interface LOCAL	interface LOCAL
interface fast	interface fast
remote-logger	remote-logger delete
delete	
remote-logger set	remote-logger set [ip]
remote-logger show	remote-logger show
route	route
sm	sm
snmp	snmp
system-name set	system-name set [name]
system-name show	system-name show
watchdog mode set	watchdog mode set [enable disable]
watchdog mode show	watchdog mode show

The following details the commands available in Config mode:

Command:	cluster
Description:	Change to Cluster configuration mode, which is used to assign the IP of router modules installed in the switch. See page A-38 for a list of the commands available in this menu.
Syntax:	cluster

Command:	factory-default
Description:	Reverts the switch to its factory default parameter settings and reloads the system.
Syntax:	factory-default

Command:	ftp
Description:	Type this command to access the CLI FTP configuration menu, which is used to define the settings of the active FTP server. Among other uses, the active FTP server is used for download of new switch software versions. See page A-39 for a list of the commands available in this menu.
Syntax:	ftp

Command:	interface IB
Description:	Type this command to access the IB Interface configuration menu, which is used to define the settings of the switch InfiniBand interface located on the sMB card. See page A-41 for a list of the commands available in this menu.
Syntax:	interface IB
Command:	interface INT
Description:	Type this command to access the INT Interface configuration menu which is used to define the settings of switch's Internal Ethernet interface; the internal Ethernet interface is used as the communication channel between redundant sMB cards, for data replication purposes. The Internal interface has a factory set default IP address (which you can see by using the show command); however, the default IP address can be changed by the administrator in interface INT configuration mode. See page Error! Bookmark not defined. for a list of the commands available in this menu.
Syntax:	interface INT
Command:	interface LOCAL
Description:	Type this command to access the Local Interface configuration menu which is used to define the settings of Local IP address. The Local IP address is a secondary IP address of the sMB card Ethernet port, and can be used to access the standby sMB card. See page A-43 for a list of the commands available in this menu.
Syntax:	interface LOCAL
Command:	interface fast
Description:	Type this command to access the Fast interface configuration menu which is used to define the settings of the switch Ethernet interface located on the sMB card. See page A-44 for a list of the commands available in this menu.
Syntax:	interface fast
Command:	remote-logger delete
Description:	Delete the remote-logger of this computer.
Syntax:	remote-logger delete

Command:	remote-logger set
Description:	Enable the remote logging feature and set the remote-logger of this device. Remote logging is used to forward system notifications to a remote logger (in addition to the internal error log). Remote logging is permitted for one remote server at a time. Setting the IP address of a remote logger overruns any existing setting of remote logging.
Syntax:	remote-logger set <IP Address>
Command:	remote-logger show
Description:	Display status of remote logging and the IP address of the remote-logger, if remote logging is enabled.
Syntax:	remote-logger show
Command:	route
Description:	Type this command to access the Route configuration menu, which is used to set the default gateway used by the switch Ethernet interface. See page A-46 for a list of the commands available in this menu.
Syntax:	route
Command:	sm
Description:	Type this command to access the Subnet Manager configuration menu, which is used to set SM parameters. See page A-47 for a list of the commands available in this menu.
Syntax:	sm
Command:	snmp
Description:	Type this command to access the SNMP configuration menu, which is used for setting parameters for support of third-party SNMP managers. See page A-65 for a list of the commands available in this menu.
Syntax:	snmp

Command: system name set

Description: Sets the system name of this switch. This is the string that will appear in the CLI prompt. You can enter any combination of letters and digits, up to 20 characters in length. In order to register the name (and prompt) change, you must log out and log in again to the CLI.

Syntax: system-name set [name]

Command: system name show

Description: Displays the system name of this switch.

Syntax: system-name show

Command: watchdog mode set

Description: Enable or disable the watchdog timer on the sMB card. The function of the WDT is to reset the switch in the event that no response is detected on the system. The watchdog timer is disabled by default.

Syntax: watchdog mode set [enable | disable]

Command: watchdog mode show

Description: Returns the state of the WDT mode (enabled or disabled).

Syntax: watchdog mode show

Command: watchdog timeout show

Description: Returns the WDT timeout setting (in milliseconds), which is the time period that must elapse before the WDT performs the reset. The WDT timeout is factory set, and can not be changed by the user.

Syntax: watchdog timeout show

Cluster Menu

The following are the commands in the Cluster menu.

```
ISR9XXX(config-cluster)#
?                               Display list of available commands
? command                       Display command's usage string
connect                         Connect to IO
end                             Exit to login menu from any other
                               mode via console connection or close
                               telnet session via telnet connection.
exit                           Exit to previous menu
io ip-address set               Set interface Ip address for IO.
io show                         Show existing IOs
```

The following details the commands available in the Cluster Menu:

Command:	connect
Description:	Establishes a CLI session with a router module installed in an ISR 9096/9288 switch.
Syntax:	connect [slot-number position-number]
Example:	connect 12 2

This example shows a CLI connection with a router module installed in the sRBD installed in slot 12 in the rear panel of the ISR 9288, in the middle router slot.

NOTE



The IP address of the router module must be on the same subnet as the SMB card with which the CLI session is established.

Command:	io ip-address set
Description:	Configures the IP address of router module installed in the switch.
Syntax:	io ip-address set [slot-number position-number ip-address]
Example:	io ip-address set 12 2 172.25.3.38

This command sets the IP address of the router module installed in the center position of the sRBD, which installed in slot 12 of the switch rear panel.

Command:	io show
Description:	Shows existing I/Os.
Syntax:	io show

FTP Menu

In the FTP menu you configure the parameters of the FTP server that the switch uses for various transactions.

The following lists the commands in the FTP menu.

```
ISR9096-3009(config-ftp)#
?          Display list of available commands
? command  Display command's usage string
end        Exit to login menu from any other mode via
          console connection or close telnet session
          via telnet connection.
exit       Exit to previous menu
export     Upload config to repository.new in remote FTP
          server, using previously defined server name,
          user name and password.
exportFile topology
          Upload Topology File to remote FTP
          server, using previously defined server name,
          user name and password.
exportSm   Upload sm Log to remote FTP server, using
          previously defined server name, user name
          and password.
ftp show   Show FTP client configuration
import     Download config repository.new from the
          remote FTP server, using previously defined
          server name, user name and password.
password   Set user password to access remote FTP server
server     Set remote FTP server name/ip-address.
username   Set user name to access remote FTP server
```

The following details the commands available in the FTP menu:

Command:	export
Description:	Uploads the configuration settings of the switch to the FTP server. Periodically backing up the switch configuration settings is recommended. The switch configuration settings can be restored when required by using the import command available in the FTP menu.
Syntax:	export <ftproot-path>
Example:	export pub/sw-config-19-june/ config.txt
Command:	exportFile topology
Description:	Uploads a file with the network topology logs (of the network nodes) to the remote FTP server.
Syntax:	exportFile topology <ftproot-path>

Command: exportSm

Description: Uploads to the FTP server a log file that stores the Subnet Manager activity. You should change the name of the file on the FTP server, as the next export action will overwrite the existing file.

Syntax: exportSm <ftproot-path>

Command: ftp show

Description: Shows FTP client configuration

Syntax: ftp show

Command: import

Description: Downloads configuration file from the FTP server.

Syntax: import [remote path][file path]

Command: password

Description: Sets user password to access remote FTP server.

Syntax: password [password]

Command: server

Description: Defines the IP address of the FTP server, which the switch will use for the various file transactions.

Syntax: server [ip-address]

Command: username

Description: Defines the user name that the switch uses to access the file server.

Syntax: username [username]

IB Interface Menu

The following are the commands of the IB Interface menu.

```
ISR9096-3009(config-if-IB)#
?                               Display list of available commands
? command                       Display command's usage string
broadcast-ib set                 Set the broadcast address.
end                              Exit to login menu from any other
                                mode via console connection or close
                                telnet session via telnet connection.

exit                             Exit to previous menu
ip-address-ib set                Set interface Ip address.
ip-address-ib show               Show interface Ip address and
                                configuration
management-interface set        Set Management Interface to be from
                                fast
mtu set                          Set interface mtu
mtu show                         Show interface mtu configuration
ping                             Send echo messages.
```

In the IB Interface menu, you configure the parameters of the InfiniBand interface of the ISR 9096/9288 sMB card. The IB interface can be used as the management interface; read the guidelines listed in page 2-9.

The following details the commands available in the IB Interface menu.

Command:	broadcast-ib set
Description:	Sets the IP address range (subnet) that the switch broadcasts to through the IB interface.
Syntax:	broadcast-fast set [ip address]
Command:	ip-address-ib set
Description:	Sets the IP address and subnet mask of the IB interface.
Syntax:	ip-address-fast set [ip-address] [netmask]
Command:	ip-address-ib show
Description:	Returns the IP address of the IB Interface, its subnet mask and the IP subnet to which the IB Interface broadcasts.
Syntax:	ip-address-ib show
Command:	management-interface set
Description:	Sets the IB interface to be the switch management interface.
Syntax:	management-interface set

Command: mtu set

Description: Sets the Maximum Transmission Unit of the IB interface.

Syntax: mtu [1500 | 2400]

Command: mtu show

Description: Show present MTU setting.

Syntax: mtu show

4 for an internal
interface.

The following details the commands available in the INT Interface menu.

Command: subnet-address-int set

Description: Sets the subnet of the internal interface. Used to communicate between the two chassis management boards.

Syntax: subnet-address-int set [subnet address]

Command: subnet-address-int show

Description: Show subnet address for an internal interface (IP: X.Y.Z.1 or X.Y.Z.0 – X,Y,Z can be configured by the user. 0 or 1 is factory set) .

Syntax: subnet-address-int show

LOCAL Interface Menu

In the Local Interface menu, you configure the Local Interface parameters. The Local IP address is a secondary IP address of the sMB card Ethernet port, and can be used to access the standby sMB card.

The following are the commands in the Local Interface menu.

```
ISR9096-3009(config-if-LOCAL)# ?
?                               Display list of available commands
? command                       Display command's usage string
end                             Exit to login menu from any other
                               mode via console connection or close
                               telnet session via telnet connection.
exit                           Exit to previous menu
ip-address-local set            Set interface Ip address.
ip-address-local show           Show interface Ip address and
                               configuration
ping                           Send echo messages.
```

The following details the commands available in the LOCAL Interface menu.

Command:	ip-address-local set
Description:	Sets the IP address and subnet mask of the Local interface.
Syntax:	ip-address-fast set [ip-address] [netmask]
Command:	ip-address-local show
Description:	Returns the IP address of the Local Interface, its subnet mask and the IP subnet to which the Local interface broadcasts.
Syntax:	ip-address-local show

Fast Interface Menu

In the Fast interface menu, you configure the Fast interface parameters. The Fast interface is used as the management interface for connection to SNMP managers, the FTP server, and for Telnet sessions; read the guidelines listed in page 2-9 for configuration settings of the Fast interface on ISR 9096/9288 switches.

The following are the commands in the Fast interface menu.

```
ISR9096-3009(config-if-fast)# ?
?                               Display list of available commands
? command                       Display command's usage string
broadcast-fast set              Set the broadcast address.
end                             Exit to login menu from any other
                               mode via console connection or
                               close telnet session via telnet
                               connection.
exit                            Exit to previous menu
ip-address-fast set             Set interface Ip address.
ip-address-fast show            Show interface Ip address and
                               configuration
mac-address-fast show           Show interface Mac address.
management-interface set       Set Management Interface to be
                               from fast
ping                           Send echo messages.
```

The following details the commands available in the Fast Interface menu.

Command:	broadcast-fast set
Description:	Sets the IP address range (subnet) that the switch broadcasts to through the fast interface.
Syntax:	broadcast-fast set [ip address]
Command:	ip-address-fast set
Description:	Sets the IP address and subnet mask of the fast interface.
Syntax:	ip-address-fast set [ip-address] [netmask]
Command:	ip-address-fast show
Description:	Returns the IP address of the Fast interface, its subnet mask and the IP subnet to which the Fast interface broadcasts.
Syntax:	ip-address-fast show
Example:	<pre>SW(config-if-fast)# ip-address-fast show local ip 172.25.2.206 ip mask is 255.255.0.0 broadcast ip is 172.25.255.255</pre>

Command : mac-address-fast show

Description: Show interface MAC address

Syntax: mac-address-fast show

Example:

```
SW (config-if-fast)# mac-address-fast show
00:10:EC:00:43:61
```

Command: management-interface set

Description: Sets the current interface to be the switch management interface (depending upon which level you are in - When under config/interface fast menu, the current management interface will be set to Fast. When under config/interface IB menu, the current management interface will be set to InfiniBand).

Syntax: management-interface set

Route Menu

In the Route menu, you configure the default gateway which the switch uses to access remote networks. The following are the commands in the Route menu.

```
ISR9096-3009(config-route)# ?
?                               Display list of available commands
? command                       Display command's usage string
default-gw delete               Delete the default gw ip address.
default-gw fast set             Set the default gw ip address for fast
                                interface.
default-gw show                 Show the default Gateway.
end                             Exit to login menu from any other mode
                                via console connection or close telnet
                                session via telnet connection.
exit                           Exit to previous menu
```

The following details the commands available in the Route menu.

Command:	default-gw delete
Description:	Deletes the IP address of the default gateway currently set in the switch.
Syntax:	default-gw delete

Command:	default-gw fast set
Description:	Sets the IP address of the switch default gateway.
Syntax:	default-gw fast set [ip address]

Command:	default-gw show
Description:	Shows the default Gateway of the fast Ethernet
Syntax:	default-gw show

Subnet Manager Menu

In the Subnet Manager menu, you configure the parameters of the Subnet Manager in the switch.

The following are the commands in the Subnet Manager menu.

ISR9096-3009(config-sm)# ?	
?	Display list of available commands
? command	Display command's usage string
bad-ports-clear set	Clear Bad Ports.
bad-ports-mode set	Enable or disable Bad Ports Mode
bad-ports-mode show	Show Bad Ports Mode.
end	Exit to login menu from any other mode via console connection or close telnet session via telnet connection.
exit	Exit to previous menu
manual-node-names show	Show the nodes in repository.
mc	Change to mc mode
partitioning-enable set	Set the status for partitioning
partitioning-enable show	Display the status for partitioning
pkey delete	Delete Pkey Table Entry.
pkey high show	Show the high part of pkey table
pkey low show	Show the low part of pkey table.
pkey port-guid set	Set port guid in Partition Key Table.
pkey set	Set key in Partition Key Table.
pkey update	Update Partition Key Table.
pm	Change to pm mode
qos	Change to QoS configuration mode
show active-nodes	Show Active Nodes
sm-info algorithm set	sm-info algorithm set
sm-info hoq set	Set head of queue.
sm-info lmc set	Set lmc sm parameters.
sm-info mode set	Enable or disable subnet manager mechanism.
sm-info mopvl set	Set max number of operational VLs.
sm-info polling-retries set	Set polling-retries sm parameters.
sm-info priority set	Set priority sm parameters.
sm-info show	Show the sm parameters.
sm-info slv set	Set switch lifetime value.
sm-info sm-initiate-fabric-configuration set	sm-info initiate fabric sweep
sm-info sm-initiate-fabric-reconfiguration set	sm-info apply topology changes and sweep the fabric
sm-info smName set	sm-info smName set
sm-info sweep-interval set	Set sweep-interval sm parameters.
sm-info topology set	sm-info topology set
sm-info verbosity set	sm-info verbosity set
sm-info verbosityTopology set	sm-info verbosity Topology set
sFBs add	Add sFBs.
sFBs del	Delete sFB.
sFBs show	Show the sFBs.

SM syntax usage is as follows:

sm-info algorithm set	sm-info algorithm set [balanced-routing,sFB-consistency]
sm-info hoq set	sm-info hoq set [1..31]
sm-info lmc set	sm-info lmc set [int (0..7)]
sm-info mode set	sm-info mode [enable disable]
sm-info mopvl set	sm-info mopvl set [vl0,vl0-1,vl0-3,vl0-7,vl0-14]
sm-info polling-retries set	sm-info polling-retries set [int (3..30)]
sm-info priority set	sm-info priority set [int (0..15)]
sm-info show	sm-info show
sm-info slv set	sm-info slv set [1..31]
sm-info sm-initiate-fabric-configuration set	sm-info sm-initiate-fabric-configuration set
sm-info sm-initiate-fabric-reconfiguration set	sm-info sm-initiate-fabric-reconfiguration set
sm-info smName set	sm-info smName set [string]
sm-info sweep-interval set	sm-info sweep-interval set [int (10..3600)(seconds)]
sm-info topology set	sm-info topology set [Odd number, 0 -for none]
sm-info verbosity set	sm-info verbosity set [error info verbose debug function frames]
sm-info verbosityTopology set	sm-info verbosityTopologyset set [none error info verbose debug function- frames]

The following details the commands available in the SM menu.

Command:	bad-ports-clear set
Description:	Clears the bad ports table. Bad ports will be added if they meet the required conditions, as described on page 6-22, if bad ports data collection is enabled.
Syntax:	bad-ports-clear set
Command:	bad-ports-mode set
Description:	Enable or disable bad port data collection. The Bad Ports feature is disabled by default; this means that by default, the bad ports will not be reported in the fabric statistics CSV file.
Syntax:	bad-ports-mode set [enable disable]

Command:	bad-ports-mode show
Description:	Show the status of bad port data collection. When bad port collection is disabled, no recording of bad ports is done. Refer to page 6-22 for a description of this feature.
Syntax:	bad-ports-mode show
Command:	manual-node-names-show
Description:	Shows the nodes in the repository. In the VFM, the user can rename nodes. This shows the list of nodes that the user renamed.
Syntax:	manual-node-names-show
Command:	mc
Description:	Change to Multicast mode, which is used to set the Auto-join feature. See page A-54 for a list of the commands available in this menu.
Syntax:	mc
Command:	partitioning-enable set
Description:	The Subnet Manager configures the P_Key table in each HCA port based on the user configuration (associating a port with a list of P_Key's). P_Key configuration is arranged as a table in the nodes repository, a row per port GUID. Every port may be added to up to 16 partitions (Current HCA capability is limited to 8). Row 0 in the table corresponds to the default P_Key configuration. This entry is protected and can not be removed. This command enables or disables partitioning.
Syntax:	partitioning-enable set [enable, disable]
Command:	partitioning-enable show
Description:	Returns the partitioning status, which can either be enabled or disabled.
Syntax:	partitioning-enable show
Command:	pkey delete
Description:	Delete row in P_Key table.
Syntax:	pkey delete [row > 1]

Command:	pkey high show
Description:	Show the high part of P_Key table.
Syntax:	pkey high show
Command:	pkey low show
Description:	Show the low part of P_Key table.
Syntax:	pkey low show
Command:	pkey port-guid set
Description:	Add a port to a P_Key table row.
Syntax:	pkey port-guid set [row > 1] [guid]
Command:	pkey set
Description:	Adds a Pkey table.
Syntax:	pkey set [pkey-number] [row] ['0x'hex]
Command:	pkey update
Description:	Update Pkey table.
Syntax:	pkey update
Command:	pm
Description:	Type this command to access the PM configuration menu, which is used for setting Performance Management parameters. See page A-55 for a list of the commands available in this menu.
Syntax:	pm
Command:	qos
Description:	Type this command to access the QoS configuration menu which is used to define the Quality of Service (QoS) settings. See page A-61 for a list of the commands available in this menu.
Syntax:	qos
Command:	show active-nodes
Description:	Displays a list of the active nodes in fabric.
Syntax:	show active-nodes

Command:	sm-info algorithm set
Description:	Sets the routing algorithm to be implemented by the Voltaire Subnet Manager. The Voltaire Subnet Manager supports the following routing algorithms: multipath with balanced-routing and multi-path with sFB consistency.
Syntax:	sm-info algorithm set [balanced-routing sfb-consistency]
Command:	sm-info hoq set
Description:	Sets the time a packet can live at the head of a VL queue. hoq is defined as $4.096\mu s * 2^{\text{hoq}}$ if $0 \leq \text{hoq} \leq 19$, +5% / - 55%. hoq is the HOQLife component of the PortInfo attribute. If $\text{hoq} > 19$, then hoq is to be interpreted as infinite.
Syntax:	sm-info hoq set [1..31]
Command:	sm-info lmc set
Description:	Sets the number of LIDs per node in the fabric (a power of 2, from 0 to 7).
Syntax:	sm-info lmc set [int (0..7)]
Example:	sm-info lmc set 3
Remark:	8 LIDS set for every node in the fabric.
Command:	sm-info mode set
Description:	Enables or disables the Subnet Manager in the switch. When the Subnet Manager is disabled, the switch is managed by a Subnet Manager on a remote switch or host on the network.
Syntax:	sm-info mode set [enable disable]
Command:	sm-info mopvl set
Description:	Sets the maximum number of operational Virtual Lanes operational on this port. The actual number of VL is the minimum between the switch capability (VLcap) and this parameter set by the user
Syntax:	sm-info mopvl set [vl0, vl0-1, vl0-3, vl0-7, vl0-14]

Command:	sm-info polling-retries set
Description:	Sets the number of polling-retries for a Subnet Manager parameter.
Syntax:	sm-info polling-retries set [int (3..30)]
Command:	sm-info priority set
Description:	Sets the priority of the Subnet Manager (the higher the number the higher the priority). When there are two Subnet Managers in the network, the one that has the higher priority will be the Master Subnet Manager. In the event of a failure on the Master, a standby Subnet Manager (with a lower priority) will take over.
Syntax:	sm-info priority set [int (0-15)]
Command:	sm-info show
Description:	Shows the SM parameters
Syntax:	sm-info show
Command:	sm-info slv set
Description:	Sets the time a packet can live in the switch. slv is defined as $4.096\mu s * 2^{slv}$ if $0 \leq slv \leq 19$, +5% / -55%. slv is the LifeTimeValue component of the SwitchInfo attribute. If $slv > 19$, then slv is to be interpreted as infinite.
Syntax:	sm-info slv set [1..31]
Command:	sm-info sm-initiate-fabric-configuration set
Description:	Initiates fabric sweep.
Syntax:	sm-info sm-initiate-fabric-configuration set
Command:	sm-info sm-initiate-fabric-reconfiguration set
Description:	Applies topology changes (LIDs could be changed due to new route scheme) and initiates fabric sweep.
Syntax:	sm-info sm-initiate-fabric-reconfiguration set

Command:	sm-info smName set
Description:	Sets the name of the Subnet Manager.
Syntax:	sm-info smName set [string]
Command:	sm-info sweep-interval set
Description:	Sets the sweep-interval parameter.
Syntax:	sm-info sweep-interval set [int (10..3600)(seconds)]
Example:	sm-info sweep-interval set 15
Command:	sm-info topology set
Description:	Sets the number of levels in a subnet configured as a Clos (fat tree) topology. This is an odd number from 3 and up, or 0 for none.
Syntax:	sm-info topology set [Odd number, 0 - for none]
Example:	sm-info topology set 3
Command:	sm-info verbosity set
Description:	Set the verbosity level (to sm log file).
Syntax:	sm-info verbosity set [error info verbose debug function frames]
Command:	sm-info verbosity Topology set
Description:	Sets the verbosity parameters (to topology log file).
Syntax:	sm-info verbosity Topology set [none error info verbose debug function frames]
Command:	sFBs add
Description:	Adds a sFB to the sFB list. Used for Clos topology configuration.
Syntax:	sFBs add <row><Guid>
Command:	sFBs del
Description:	Deletes a selected sFB from the sFB list. If you wish to edit sFB data, you must first perform a delete operation and then an add sFB operation. Used for topology Clos configuration.
Syntax:	sFBs del <row>

Command:	sFBs show
Description:	Displays the sFBs list defined in the switch, including entry numbers and GUIDs.
Syntax:	sFBs show

MC Menu

The following are the commands in the Subnet Manager MC sub-menu.

```
ISR9096-3009(config-sm-mc)# ?
?                Display list of available commands
? command        Display command's usage string
end              Exit to login menu from any other mode
                  via console connection or close telnet
                  session via telnet connection.
exit             Exit to previous menu
mc auto-join set Set the auto join for the MC.
mc show          Show mc's settings
```

The following details the commands available in the Subnet Manager MC sub-menu.

Command:	mc auto-join set
Description:	Enables the Multicast Auto-join mode; this mode is disabled by default. In Multicast Auto-join mode a multicast group is created by the SM. HCAs can join or leave the Multicast group.
Syntax:	mc auto-join set [disable, enable]

Command:	mc show
Description:	Show Multicast mode setting, enabled to disabled.
Syntax:	mc show

PM Commands

The following are the commands in the Subnet Manager PM sub-menu.

```
ISR9096-3009(config-sm-pm)# ?
?                               Display list of available
                               commands
? command                       Display command's usage string
end                             Exit to login menu from any
                               other mode via console
                               connection or close telnet
                               session via telnet connection.

exit                           Exit to previous menu
pm alert-ats set               Set alert ats for the PM.
pm alert-join set             Set alert join for the PM.
pm counter-operation set      Set the counter operation for
                               the PM.
pm enable set                 Set the Enable for the PM.
pm excessive-buffer-overflow-errors set
                               Set the excessive-buffer-
                               overrun-errors for the PM.
pm link-downed-counter set    Set the link-downed-counter for
                               the PM.
pm link-error-recovery-counter set
                               Set the link-error-recovery-
                               counter for the PM.
pm local-link-integrity-errors set
                               Set the local-link-integrity-
                               errors for the PM.
pm polling-interval set       Set the polling-interval for the
                               PM.
pm port-rcv-constraint-errors set
                               Set the port-rcv-constraint-
                               errors for the PM.
pm port-rcv-errors set        Set the port-rcv-errors for the
                               PM.
pm port-rcv-remote-physical-errors set
                               Set the port-rcv-remote-
                               physical-errors for the PM.
pm port-rcv-switch-relay-errors set
                               Set the port-rcv-switch-relay-
                               errors for the PM.
pm port-xmit-constraint-errors set
                               Set the port-xmit-constraint-
                               errors for the PM.
pm port-xmit-discards set     Set the port-xmit-discards for
                               the PM.
pm report-enable set          Set report enable for the PM.
pm reset-counters set         Reset PM counters .
pm scope set                  Set the scope for the PM.
pm show                       Show pm's settings
pm symbol-error-counter set   Set the symbol-error-counter for
                               the PM.
pm trap-mask set              Set the trap mask for the PM.
pm vl15-dropped set           Set the vl15-dropped for the PM.
```

PM syntax usage is as follows:

pm alert-ats set	pm alert-ats set [enable disable]
pm alert-join set	pm alert-join set [enable disable]
pm counter-operation set	pm counter-operation set [delta, avg ,avg_sum ,min,max]
pm enable set	pm enable set [disable, enable]
pm excessive-buffer-overflow-errors set	pm excessive-buffer-overflow-errors set [0,15]
pm link-downed-counter set	pm link-downed-counter set [0,256]
pm link-error-recovery-counter set	pm link-error-recovery-counter set [0,256]
pm local-link-integrity-errors set	pm local-link-integrity-errors set [0,15]
pm polling-interval set	pm polling-interval set [60-65535]
pm port-rcv-constraint-errors set	pm port-rcv-constraint-errors set [0,256]
pm port-rcv-errors set	pm port-rcv-errors set [0,65535]
pm port-rcv-remote-physical-errors set	pm port-rcv-remote-physical-errors set [0,65535]
pm port-rcv-switch-relay-errors set	pm port-rcv-switch-relay-errors set [0,65535]
pm port-xmit-constraint-errors set	pm port-xmit-constraint-errors set [0,256]
pm port-xmit-discards set	pm port-xmit-discards set [0,65535]
pm report-enable set	pm report-enable set [enable disable]
pm reset-counters set	pm reset-counters set
pm scope set	pm scope set [all, all_hca ,all_sw ,node_list]
pm show	pm show
pm symbol-error-counter set	pm symbol-error-counter set [0,65535]
pm trap-mask set	pm trap-mask set [none, default ,all]
pm vl15-dropped set	pm vl15-dropped set [0,65535]

The following details the commands available in the Subnet Manager PM sub-menu.

Command:	pm alert-ats set
Description:	Port counter CSV file alert flag that takes into consideration the ATS registration.
Syntax:	pm alert-ats set [enable disable]

Command:	pm alert-join set
Description:	Port counter CSV file alert flag that takes into consideration the JOIN issue (HCA joined).
Syntax:	pm alert-join set [enable disable]

Command:	pm counter-operation set
Description:	<i>Future option.</i> In the present software release, only the delta option is supported: the PM monitors the difference per interval for each counter and generates an error when it passes the predefined threshold.
Syntax:	pm counter-operation set [delta avg avg_sum min max]

Command:	pm enable set
Description:	Controls PM operation. The default is enabled. If disabled, PM data viewing will not be available in the Voltaire Fabric Manager.
Syntax:	pm enable set [enable disable]

Command:	pm excessive-buffer-overflow-errors set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5).
Syntax:	pm excessive-buffer-overflow-errors set [0 - 15]

Command:	pm link-downed-counter set [0 - 255]
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 1)
Syntax:	pm link-downed-counter set [0 - 255]

Command:	pm link-error-recovery-counter set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 1)
Syntax:	pm link-error-recovery-counter set [0 - 255]

Command:	pm local-link-integrity-errors set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5).
Syntax:	pm local-link-integrity-errors set [0 - 15]
Command:	pm polling-interval set
Description:	Defines PM polling interval in seconds (default: 180).
Syntax:	pm polling-interval set [60-65535]
Command:	pm port-rcv-constraint-errors set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5)
Syntax:	pm port-rcv-constraint-errors set [0 - 255]
Command:	pm port-rcv-errors set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5)
Syntax:	pm port-rcv-errors set [0 - 65535]
Command:	pm port-rcv-remote-physical-errors set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5).
Syntax:	pm port-rcv-remote-physical-errors set [0 - 65535]
Command:	pm port-rcv-switch-relay-errors set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5).
Syntax:	pm port-rcv-switch-relay-errors set [0 - 65535]
Command:	pm port-xmit-constraint-errors set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5).
Syntax:	pm port-xmit-constraint-errors set [0 - 255]

Command:	pm port-xmit-discards set
Description:	Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5).
Syntax:	pm port-xmit-discards set [0 - 65535]
Command:	pm report-enable set
Description:	Determines whether the PM should generate a port counter report file (in CSV format); the port counter report file can be viewed through the Fabric Manager. The default is enabled.
Syntax:	pm report-enable set [enable disable]
Command:	pm reset-counters set
Description:	Resets the PM counters on all nodes defined by the pm scope set command.
Syntax:	pm reset-counters set
Command:	pm scope set
Description:	Defines the scope for PM monitoring.
Options include:	
all	all nodes in the fabric (switches and HCAs)
all_hca	only HCAs
all_sw	only switches
node_list	future option
Default is all	nodes in the fabric.
Syntax:	pm scope set [all all_hca all_sw node_list]

Command: pm show

Description: Shows the current PM (Performance Management) configuration.

Syntax: pm show

Example:

```
ISR-9024(config-sm-pm)# pm show
Enable enable
Trap mask default
Polling interval 180
Scope all
Counter operation delta
Symbol error counter threshold 5
Link error recovery counter threshold 1
Link downed counter threshold 1
Port rcv errors threshold 5
Port rcv remote physical errors threshold 5
Port rcv switch relay errors threshold 5
Port xmit discards threshold 5
Port rcv constraint errors threshold 5
Port xmit constraint errors threshold 5
Local link integrity errors threshold 5
Excessive buffer overrun errors threshold 5
Vl15 dropped threshold 5
Port xmit data threshold 0
Port rcv data threshold 0
Port xmit pkts threshold 0
Port rcv pkts threshold 0
Report enable enable
```

Command: pm symbol-error-counter set

Description: Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5).

Syntax: pm symbol-error-counter set [0 - 65535]

Command: pm trap-mask set

Description: Defines which event is reported by the event logger (Default: default).

Syntax: pm trap-mask set [none | default | all]

Command: pm vl15-dropped set

Description: Defines the error threshold for this counter. Setting to 0 disables counter monitoring (default: 5).

Syntax: pm vl15-dropped set [0 - 65535]

QoS Menu

The following are the commands in the Subnet Manager QoS sub-menu.

(config-sm-qos)# ?	
?	Display list of available commands
? command	Display command's usage string
end	Exit to login menu from any other mode via console connection or close telnet session via telnet connection.
exit	Exit to previous menu
qos-apply-configuration set	Set the change flag for QoS
qos-configuration-enable set	Set the Enable Configuration flag for QoS
qos-info show	show the QoS parameters.
qos-sl-vl set	Set VL in SL-VL Table.
qos-sl-vl show	Show QoS SL-VL Table.
qos-vl-high-arbitration set	Set Table.
qos-vl-high-arbitration show	Show QoS High Arb. Table.
qos-vl-high-arbitration-limit set	Set the VL high arbitration limit for QoS
qos-vl-low-arbitration set	Set Table.
qos-vl-low-arbitration show	Show QoS Low Arb. Table.

QoS syntax usage is as follows:

qos-apply-configuration set	qos-apply-configuration set [yes, no]
qos-configuration-enable set	qos-configuration-enable set [enable, disable]
qos-info show	qos-info show
qos-sl-vl set	qos-sl-vl set [row] [vl]
qos-sl-vl show	qos-sl-vl show
qos-vl-high-arbitration set	qos-vl-high-arbitration set [row] [vl] [weight]
qos-vl-high-arbitration show	qos-vl-high-arbitration show
qos-vl-high-arbitration-limit set	qos-vl-high-arbitration-limit set [number]
qos-vl-low-arbitration set	qos-vl-low-arbitration set [row] [vl] [weight]
qos-vl-low-arbitration show	qos-vl-low-arbitrations show

In the QoS menu, you configure the Quality of Service (QoS) parameters. The following details the commands available in the Subnet Manager QOS sub-menu.

Command:	qos-apply-configuration set
Description:	Changes made to the QoS configuration will be saved after typing qos-apply-configuration set yes.
Syntax:	qos-apply-configuration set [yes, no]
Command :	qos-configuration-enable set
Description:	Sets the Enable Configuration flag for QoS.
Syntax:	qos-configuration-enable set [enable, disable]
Command :	qos-info show
Description:	shows the QoS parameter information.
Syntax:	qos-info show
Command :	qos-sl-vl set
Description:	Sets VL to SL mapping, as described on page 3-49.
Syntax:	qos-sl-vl set [row] [virtual lane]
Command :	qos-sl-vl show
Description:	Displays the QoS SL-VL Table.
Syntax:	qos-sl-vl show
Command :	qos-vl-high-arbitration set
Description:	Sets the High Arbitration table, as described on page 3-51.
Syntax:	qos-vl-high-arbitration-limit set [row] [virtual lane] [priority weight]
Command :	qos-vl-high-arbitration show
Description:	Shows the High Arbitration table.
Syntax:	qos-vl-high-arbitration-limit show
Command :	qos-vl-high-arbitration-limit set
Description:	Sets the Limit of High Priority parameter described on page 3-51.
Syntax:	qos-vl-high-arbitration-limit set [number]

Command :	qos-vl-low-arbitration set
Description:	Sets the Low Arbitration table, as described on page 3-51.
Syntax:	qos-vl-low-arbitration set [row] [virtual lane] [weight]
Command :	qos-vl-low-arbitration show
Description:	Shows the Low Arbitration table, as described on page 3-51.
Syntax:	qos-vl-low-arbitration show

Example of SM Parameter Configuration

Parameter	Description
Max OPerational VL	Virtual Lanes operational on this port are indicated as follows: 1: VL0 2: VL0, VL1 3: VL0 - VL3 4: VL0 - VL7 5: VL0 - VL14
HOQ Life -	Sets the time a packet can live at the head of a VL queue.
LifeTimeValue	Sets the time a packet can live in the switch

HOQ and LifeTimeValue control transmitter queuing as follows:

The transmitter packet discard is based on, among other things, two time values: Switch Lifetime Limit (SLL) and Head of Queue Lifetime Limit(HLL).

SLL is defined as $4.096\mu s * 2^{LV}$ if $0 \leq LV \leq 19$, +5% / -55%.

LV is the LifeTimeValue component of the SwitchInfo attribute.

If $LV > 19$, then SLL is to be interpreted as infinite.

HLL is defined as $4.096\mu s * 2^{HL}$ if $0 \leq HL \leq 19$, +5% / -55%.

HL is the HOQLife component of the PortInfo attribute.

If HL > 19, then HLL is to be interpreted as infinite.

To set these parameters, enter the following commands:

```
(config-sm)# sm-info hoq set [1..31]
(config-sm)# sm-info slv set [1..31]
(config-sm)# sm-info mopvl set [vl0,vl0-1,vl0-3,vl0-7,vl0-14]
(config-sm)# mc
(config-sm-mc)# mc auto-join set [disable, enable]
```

SM Auto Join mode (Mini SM-like operation). When enabled, the Subnet Manager will automatically add each active end port (HCA/SW) to the default IPoIB multicast group (MGID 0xFF12401BFEFF000000000000FFFFFFFF).

SNMP Menu

In the SNMP menu, you configure the parameters of the switch SNMP interface. Using the SNMP interface, the switch can be managed by third party managers. Refer to Remote Management Setting, Section 4.7.2 for further information and for settings information via the GUI.

The following are the commands in the Subnet Manager SNMP sub-menu.

```
ISR9096-3009(config-snmp)# ?
?                               Display list of available commands
? command                       Display command's usage string
end                             Exit to login menu from any other
                               mode via console connection or
                               close telnet session via telnet
                               connection.

exit                           Exit to previous menu
snmp cluster-monitor set       Set the cluster monitor string
snmp cluster-monitor show      Show cluster monitor string.
snmp community get             Get the snmp 'get community'
snmp community set             Set the snmp 'set community'
snmp community show            Show the snmp communities.
snmp community trap            Set the snmp 'trap community'
snmp contacts set              Set the snmp contacts
snmp contacts show             Show the snmp agent contacts.
snmp description set           Set the snmp description
snmp description show          Show the snmp agent description.
snmp location set              Set the snmp location
snmp location show             Show the snmp agent location.
```

The following details the commands available in the Subnet Manager SNMP sub-menu.

Command: snmp cluster-monitor set

Description: Sets the path of the Ganglia Monitoring tool.
In your browser, enter the string as follows:

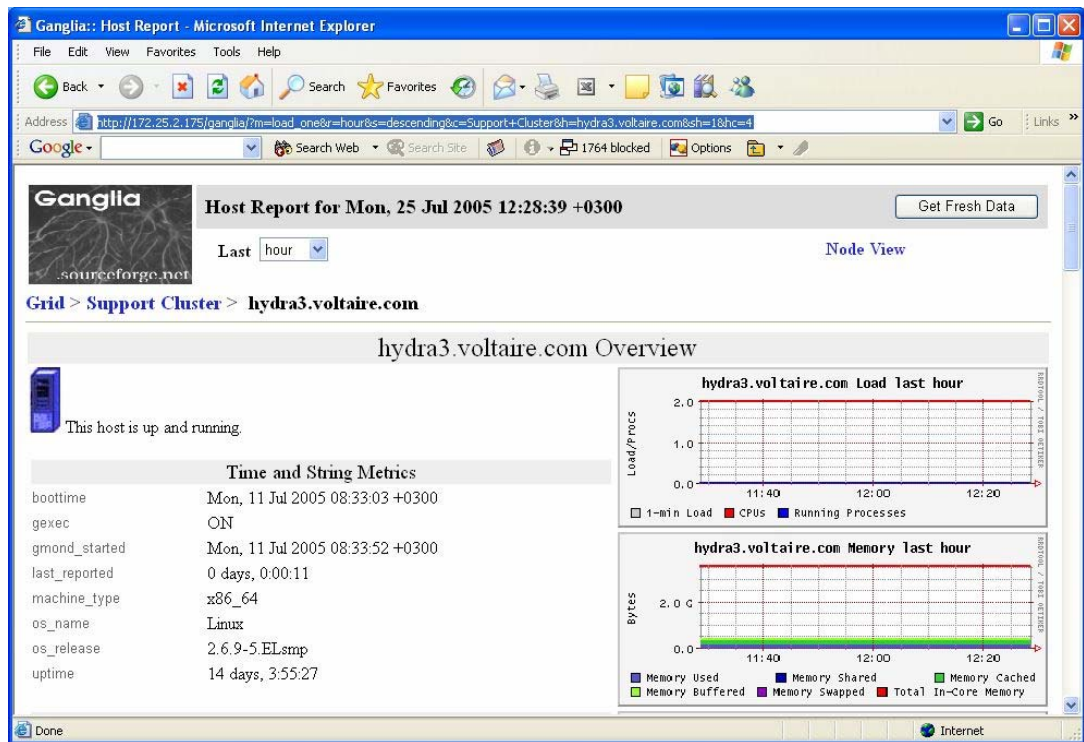
1. Cluster Head Node IP Address
2. Ganglia tool
3. Cluster Name
4. Name of the Host

Syntax: snmp cluster-monitor set [string]

Example:

[http://172.25.2.175/ganglia/?m=load_one&r=hour&s=descending&c=Support+Cluster&h=\\$HOST&sh=1&hc=4](http://172.25.2.175/ganglia/?m=load_one&r=hour&s=descending&c=Support+Cluster&h=$HOST&sh=1&hc=4)

In the example below, the Host is called hydra3.voltaire.com



Command: snmp cluster-monitor show

Description: Shows the SNMP cluster monitor.

Syntax: snmp cluster-monitor show

Command: snmp community get

Description: Sets the SNMP get community string. The default get community string is public.

Syntax: snmp community get [public|private]

Command: snmp community set

Description: Sets the SNMP set community string. The default set community string is private.

Syntax: snmp community set [public|private]

Command: snmp community show

Description: Shows to which SNMP community string [public|private] the system is connected (for both get and set commands).

Syntax: snmp community show

Command:	snmp community trap
Description:	Sets the SNMP trap community. The default trap community string is public.
Syntax:	snmp community trap [public private]
Command:	snmp contacts set
Description:	Sets the SNMP contacts.
Syntax:	snmp contacts set [contacts]
Command:	snmp contacts show
Description:	Shows the SNMP agent contacts.
Syntax:	snmp contacts show
Command:	snmp description set
Description:	Sets the SNMP description.
Syntax:	snmp description set [description]
Command:	snmp description show
Description:	Displays version information on the SNMP agent in the switch.
Syntax:	snmp description show
Command:	snmp location set
Description:	Sets the SNMP location.
Syntax:	snmp location set [location]
Command:	snmp location show
Description:	Shows the SNMP agent location.
Syntax:	snmp location show



Appendix B Port Counters

B.1 Description of PortCounter Fields

For each active node port the following info presented in a single line per port.

Item	Description
Platform Type	ISR9288 ISR9024, HCA400
ModuleType	GER-400 – Ethernet to InfiniBand router FCR-400 – Fiber channel to InfiniBand router sLB24 – ISR9288 line board sFB12 – ISR9288 Fabric board System –ISR9024, HCA400
ModuleIndex	The number of the module where the port exists. 0 for HCA or ISR9024
Port	External port number or “internal#” for internal ports
Name	Node name where possible, otherwise the nodes GUID .
NodeIP	The IP address associated where this node where possible, otherwise 0.0.0.0
DeviceID	Voltaire product device ID
MLID(#JoinedGroups)	The multicast group ID that this port belongs to.
Error and data counters	Each port has 16 counters, 12 error counters and 4 data counters. Error counters include: SymErr, LinkRecovers, XmtDiscards, XmtConstraint, RevConstraint, LocalLinkInteg, ExcessBufOvrrun, VL15Dropped Data Counters include: XmitBytes, RevBytes, XmitPkts, Rev Pkts

Item	Description
PeerLID39	The remote connected Ports LID
PeerIBPort	The remote connected Ports internal Port number
PeerPortGUID	The remote connected Ports GUID
PeerPlatformType	The remote connected Ports platform (ISR9288 ISR9024, HCA400)
PeerName	The remote connected Ports node name (node name or GUID)
PeerModuleType	This remote connected Ports Module Type (see ModuleType)
PeerModuleIndex	The number of the module where the remote connected Port exists (see ModuleIndex)
PeerPort	The external port number or “internal#” for internal ports where the remote connection exists.
Status	OK or ALERT (port counter exceed threshold, 1X link, etc...)

Table B-1. Port Counters Fields Description

B.2 CSV Summary Report

In addition, the CVS summary report fields are detailed below.

Item	Description
Alert Ports:	Total current ALERT flagged ports
Total Switches:	Total active switch chips
Switch Ports:	Total active switch chips ports
Switch Alert Ports:	Total current switch ALERT flagged ports
Total HCAs:	Total active HCA chips
HCA Ports:	Total active HCA chips ports
HCA Alert Ports:	Total current HCA ALERT flagged ports

Table B-2. CVS Summary Report Fields Description

B.3 Available Fabric Port Counters

PM Counters Values and Default Thresholds

Table B-3 specifies each monitored counter, its parameter value, and its default threshold. Setting the PM threshold to zero (0) or unchecking a counter disables monitoring of the corresponding counter. You can also change the default threshold by entering a different value in the respective field.

Monitored Counter	Values	Default Threshold
Pm link-error-recovery-counter set	0 – 255	1
Pm link-downed-counter set	0 – 255	1
Pm port-rcv-remote-physical-errors	0 – 65535	5
Pm port-rcv-switch-relay-errors	0 – 65535	5
Pm port-rcv-errors	0 – 65535	5
Pm port-xmit-errors	0 – 65535	5
Port xmit pkts threshold	0 – 65535	5
Port rcv pkts threshold	0 – 65535	5
Pm port-xmit-discards	0 – 65535	5
Pm port-rcv-errors	0 – 65535	5
pm port-xmit-errors	0 – 65535	5
Port xmit pkts threshold	0 – 65535	5
Port rcv pkts threshold	0 – 65535	5
pm port-rcv-constraint-errors	0 – 255	5
Pm port-xmit-constraint-errors	0 – 255	5
Pm local-link-integrity-errors	0 – 15	5
Pm excessive-buffer-overflow-errors	0 – 15	5
Pm vl15-dropped	0 – 65535	5
Pm symbol-error-counter	0 – 65535	5
Pm port-rcv-errors	0 – 65535	5
Pm port-xmit-errors	0 – 65535	5
Port xmit pkts threshold	0 – 65535	5
Port rcv pkts threshold	0 – 65535	5

Table B-3. PM Counters Tresholds

Port Counters List and Description

The Port Counters currently supported are as follows:

Counter	Description	Importance
SymbolErrorCounter	Total number of symbol errors received on one or more lanes.	This counter can increase without it indicated a significant problem
LinkErrorRecoveryCounter	Total number of times the Port Training state machine has successfully completed the link error recovery process.	If SymbolErrors are increasing quickly AND this counter is increasing, it may be indicating a bad link
LinkDownedCounter	Total number of times the Port Training state machine has failed the link error recovery process and downed the link	This counter is typically a true indication of the number of times the port has gone down (usually for valid reasons)
PortRcvErrors	Total number of packets containing an error that were received on a port. These errors include: Local physical errors (CRC, VCRC, FCCRC and all physical errors that cause entry into the BAD PACKET or BAD PACKET DISCARD states of the packet receiver state machine) Malformed data packet errors Malformed link packet errors Packets discarded due to buffer overrun	This counter should not be increasing and a constantly increasing number probably indicates a bad link.
PortRcvRemotePhysicalErrors	Total number of packets marked with the EBP delimiter received on the port.	This indicates that a problem is occurring ELSEWHERE in the fabric and that this port received a packet that was intentionally corrupted by another switch in the fabric.
PortRcvSwitchRelayErrors	Total number of packets received on the port that were discarded because they could not be forwarded by the switch relay. Reasons for this include:	This counter can increase due to valid event occurring in the network.

Counter	Description	Importance
	DLID mapping VL mapping Looping (output port = input port)	
PortXmitDiscards	Total number of outbound packets discarded by the port because the port is down or congested. Reasons for this include: Output port is in the inactive state Packet length exceeded neighbor MTU Switch lifetime limit exceeded Switch HOQ limit exceeded	Typically will not increase. If it is, may be an indicator that HOQ or other parameter should be tweaked. Please contact Voltaire Customer Support.
PortXmitConstraintErrors	Total number of packets not transmitted from the port for the following reasons: FilterRawOutbound is true and packet is raw PartitionEnforcementOutbound is true and packet fails partition check, IP version check, or transport header version check.	Typically will not increase. If it is, may be an indicator that a parameter should be tweaked. Please contact Voltaire Customer Support.
PortRcvConstraintErrors	Total number of packets received on the port that are discarded for the following reasons: FilterRawOutbound is true and packet is raw PartitionEnforcementOutbound is true and packet fails partition check, IP version check, or transport header version check.	Typically will not increase. If it is, may be an indicator that a parameter should be tweaked. Please contact Voltaire Customer Support
LocalLinkIntegrityErrors	The number of times that the frequency of packets containing local physical errors exceeded local_phy_errors.	This counter increasing in number usually indicates a bad link.

Counter	Description	Importance
ExcessiveBufferOverrunErrors	The number of times that overrun_errors consecutive flow control update periods occurred with at least one overrun error in each period (see Table 126 PortInfo on page 665 of the IB spec).	Typically will not increase. If it is, may be an indicator that a parameter should be tweaked. Please contact Voltaire Customer Support
PortXmitDiscards	Total number of outbound packets discarded by the port because the port is down or congested. Reasons for this include: Output port is in the inactive state Packet length exceeded neighbor MTU Switch lifetime limit exceeded Switch HOQ limit exceeded	Typically will not increase. If it is, may be an indicator that HOQ or other parameter should be tweaked. Please contact Voltaire Customer Support.
PortXmitConstraintErrors	Total number of packets not transmitted from the port for the following reasons: FilterRawOutbound is true and packet is raw PartitionEnforcementOutbound is true and packet fails partition check, IP version check, or transport header version check.	Typically will not increase. If it is, may be an indicator that a parameter should be tweaked. Please contact Voltaire Customer Support.
PortRcvConstraintErrors	Total number of packets received on the port that are discarded for the following reasons: FilterRawOutbound is true and packet is raw PartitionEnforcementOutbound is true and packet fails partition check, IP version check, or transport header version check.	Typically will not increase. If it is, may be an indicator that a parameter should be tweaked. Please contact Voltaire Customer Support
LocalLinkIntegrityErrors	The number of times that the frequency of packets containing local physical errors	This counter increasing in number usually indicates a bad link.

Counter	Description	Importance
	exceeded local_phy_errors.	
ExcessiveBufferOverrunErrors	The number of times that overrun_errors consecutive flow control update periods occurred with at least one overrun error in each period (see Table 126 PortInfo on page 665 of IB spec).	Typically will not increase. If it is, may be an indicator that a parameter should be tweaked. Please contact Voltaire Customer Support
VL15Dropped	Number of incoming VL15 packets dropped due to resource limitations on port selected by PortSelect (due to lack of buffers)	This counter increasing in small increments is not seen as a problem.
PortXmitData	Total number of data octets, divided by 4, transmitted on all VLs from the port selected by PortSelect. This includes all octets between (and not including) the start of packet delimiter and VCRC. It excludes all link packets.	
PortRcvData	Total number of data octets, divided by 4, received on all VLs from the port selected by PortSelect. This includes all octets between (and not including) the start of packet delimiter and VCRC. It excludes all link packets.	
PortXmitPackets	Total number of packets, excluding link packets, transmitted on all VLs from the port.	
PortRcvPackets	Total number of packets, excluding link packets, received on all VLs from the port.	

Table B-4. Available Port Counters



Appendix C Supported Traps and Events

An event corresponds to an occurrence within the fabric. Traps are generated, some of which are translated into alarms, per severity, according to Voltaire or user-defined thresholds.

C.1 Trap Structure

Each trap is characterized by the parameters listed below.

A **Header**, invisible to the user, which includes the following fields:

- Trap number
- Object type
- Object
- Object's peer

Object fields are as follows:

- Guid
- Lid
- Port number
- Node/System Guid
- Platform type
- Module type
- Module Index
- Subtype (logical port number)
- System name

The object type could be **port**, **node** (switch, router or HCA) or **SM**.

Object peer is relevant for port object type only, meaning connected port.

In case any of the above fields is unknown or irrelevant, it will have null value.

The object type is required for log formatting.

Node object format is the same as a port format without port number and connected peer.

SM object format is as follows: "SM on < logical-name or Sys-GUID>".

Parameters

The types of parameters below are defined as in trap originator side (SM).

They could be changed to more generic types in API or SNMP trap.

An example of event log window is shown below:

```
ISR9XXX(utilities) event-log show
Jul 13 09:49:56 0 vsm[440]: 0008f104003f074e,    port 22 -
1X port was found [ Port-GUID 8f104003f074e IB Port 22. Peer
at: 0008f104003f074e,    port 24 Port-GUID 8f104003f074e IB
Port 24. ]
Jul 13 09:49:56 0 vsm[440]: 0008f104003f074e,    port 24 -
1X port was found [ Port-GUID 8f104003f074e IB Port 24. Peer
at: 0008f104003f074e,    port 22 Port-GUID 8f104003f074e IB
Port 22. ]
```

C.2 Trap/Alarm Table

The table below provides detailed specification of traps and alarms.

NOTE



Not all traps and events apply to the current version.

Alarm No.	Alarm/Trap Name	Map Trap to Alarm?	IB Trap	Severity	Default	Corrective	Log format
1	PORT_COUNTERS_ERROR						
	PM_SymbolError Object: port Parameters: current value, last value	Y		warning	enable	Manual	Symbol-Error counter threshold was exceeded. New value is XYZ, previous value was XYZ.
	PM_LinkErrorRecovery Object: port Parameters: current value, last value	Y		minor	enable	manual	Link-Error-Recovery counter threshold was exceeded. New value is XXX, previous value was XYZ.
	PM_LinkDownedCounter Object: port Parameters: current value, last value	Y		critical	enable	manual	Link-Downed counter threshold was exceeded. New value is XXX, previous value was XYZ.
	PM_PortRcvErrors Object: port Parameters: current value, last value	Y		minor	enable	manual	PortRcvErrors counter threshold was exceeded. New value is XXX, previous value was XYZ.
	PM_PortRcvRemotePhysicalErrors Object: port Parameters: current value, last value	Y		minor	enable	manual	PortRcvRemotePhysicalErrors counter threshold was exceeded. New value is XXX, previous value was XYZ.
	PM_PortRcvSwitchRelayErrors Object: port Parameters: current value, last value	Y		warning	disable	manual	PortRcvSwitchRelayErrors counter threshold was exceeded. New value is XXX, previous value was XYZ.
	PM_PortXmitDiscards Object: port Parameters: current value, last value	Y		warning	enable	manual	PortXmitDiscards counter threshold was exceeded. New value is XXXs, previous value was XYZ.
	PM_PortXmitConstraintErrors Object: port Parameters: current value, last value	Y		minor	enable	manual	PortXmitConstraintErrors counter threshold was exceeded. New value is XXX, previous value was XYZ.
	PM_PortRcvConstraintErrors Object: port Parameters: current value, last value	Y		minor	enable	manual	PortRcvConstraintErrors counter threshold was exceeded. New value is XXX, previous value was XYZ.
	PM_LocalLinkIntegrityErrors Object: port Parameters: current value, last value	Y		minor	enable	manual	LocalLinkIntegrityErrors counter threshold was exceeded. New value is XXX, previous value was XYZ.
	PM_ExcessiveBufferOverrunErrors Object: port Parameters: current value, last	Y		minor	enable	manual	ExcessiveBufferOverrunErrors counter threshold was exceeded. New value is XXX, previous value was XYZ.

Alarm No.	Alarm/Trap Name	Map Trap to Alarm?	IB Trap	Severity	Default	Corrective	Log format
	value						
	PM_VL15Dropped Object: port Parameters: current value, last value	Y		warning	enable	manual	VL15Dropped counter threshold was exceeded. New value is XXX, previous value was XYZ.
2	FABRIC_CONFIG_ERROR						
	OSM_EVENT_INVALID_LINK Object: port Parameters: node_type1 (string), node_type2 (string)	Y		critical	enable	manual	Found invalid link from %s GUID %016Lx port#XYZ to %s GUID %016Lx port#XYZ.
	OSM_EVENT_BROKEN_LINK Object: port Parameters: node_type1 (string)	Y		warning	enable	manual	Found broken link on %s GUID %016Lx port#XYZ.
	OSM_EVENT_NO_AVAILABLE_LID Object: port Parameters: lmc1 (uchar8)	Y		warning	enable	manual	Unable to find available LID range. LMC value is %u.
	OSM_EVENT_LMC_TOO_BIG Object: SM param: lmc1 (uchar8), lmc2 (uchar8)	Y		warning	enable	manual	Unable to configure the subnet with LMC XYZ, using smaller LMC XYZ.
	OSM_EVENT_DUP_HCA_GUID Object: port Parameters: node_type1 (string)	Y		critical	enable	manual	Found duplicate %s port GUID %016Lx port#XYZ (conflicting ports or path).
	OSM_EVENT_DUP_SWITCH_GUID Object: port Parameters: node_type1 (string), node_type2 (string).	Y		critical	enable	manual	Found duplicate %s port GUID %016Lx port#XYZ (another %s already exists).
3	GID_OUT						
	GID_ADDR_IN_SERVICE_TRAP_64 Object: SM Parameters: GID (prefix (uint64), id (uint64))	N	64	normal			Port GID %016Lx%016Lx was connected to the fabric
	GID_ADDR_OUT_SERVICE_TRAP_65 Object: SM (Note: for HCA port# is 1 or 2, for switch port# is 0) Parameters: GID (prefix (uint64), id (uint64))	Y	65	warning	enable	IB trap 64	Port GID %016Lx%016Lx was disconnected from the fabric.
4	LINK_INTEGRITY_ERROR						
	SRV_LOCAL_LINK_INTEGRITY_TRAP_129 Object: port	Y	129	minor	enable	Manual	Local Link Integrity threshold reached.
5	FLOW_CONTROL_ERROR						
	SRV_EXCESSIVE_BUF_OVERRUN_TRAP_130 Object: port	Y	130	minor	enable	Manual	Excessive Buffer Overrun threshold reached.
	SRV_FLOW_CONTROL_TIMER_EXPIRED_TRAP_131 Object: port	Y	131	minor	enable	Manual	Switch Flow Control Update watchdog timer expired.
	FABRIC_CONFIG_ERROR - phase II						
	OSM_EVENT_1X_LINK Object: port	Y		minor	enable	manual	Found a 4X link that operates in 1X
	OSM_EVENT_4X_1X_LINK	Y		minor	enable	manual	Found a 12X link that operates in

Alarm No.	Alarm/Trap Name	Map Trap to Alarm?	IB Trap	Severity	Default	Corrective	Log format
	Object: port						4X or 1X
	OSM_EVENT_SM_LINEAR_FD B_CAP_TO_SMALL Object: SM Parameters: fdb cap (uint16), lmc (uchar8)	N		minor			Unable to configure all LIDs on Switch GUID %016Lx. Linear FDB Cap (XYZ) is too small for current subnet LMC XYZ.
	SRV__BAD_M_KEY_TRAP_256 Object: node Parameters: m_key (uint64), method (string), attr (string), attr mod (uint32)	N	256	minor	enable	manual	M Key 0x%X, from LID XYZ attempted Method %s with Attribute %s and AttributeModifier 0x%X.
	OSM_EVENT_UNKNOWN_TRAP Object: node Parameters: trap number (uint16)	N		warning			Received unknown trap number XYZ from LID XYZ.
	SRV__LINK_TIMEOUT_EVENT Object: port Parameters: method (string), attr (string), path	N		warning	enable		Link timeout. Method %s attribute %s, DR path %s.
	SECURITY_ERROR						
	SRV__BAD_P_KEY_TRAP_257 Object: node Parameters: p_key (uint16), from lid (uint16), from gid(prefix, id), from qp (uint32), to lid (uint16), to gid (prefix, id), to qp (uint32), sl (uint16)	N	257	minor	enable	manual	P Key 0x%X, from LID XYZ /GID %016Lx%016Lx /QP XYZ to LID XYZ /GID %016Lx%016Lx /QP XYZ> on SL XYZ.
	SRV__BAD_Q_KEY_TRAP_258 Object: node Parameters: q_key (uint32), from lid(uint16), from gid(prefix, id), from qp (uint32), to lid (uint16), to gid (prefix, id), to qp (uint32), sl (uint16)	N	258	minor	enable	manual	Q Key 0x%X, from <LID XYZ /GID %016Lx%016Lx /QP XYZ> to LID XYZ /GID %016Lx%016Lx /QP XYZ> on SL XYZ.
	SRV__SWITCH_BAD_P_KEY_TRAP_259 Object: port Parameters: data valid, p_key (uint16), from lid, from gid(prefix, id), from qp, to lid, to gid (prefix, id), to qp, sl	N	259	minor	enable	manual	DataValid 0x%04X, P Key 0x%X, from <LID XYZ /GID %016Lx%016Lx /QP XYZ> to LID XYZ /GID %016Lx%016Lx /QP XYZ> on SL XYZ at switch LID XYZ port#XYZ.
	SRV__SM_INFO_EVENT						
	OSM_EVENT_OUT_OF_RESOURCE_STATUS Object: node Parameters: multicast (string)	N		warning	disable	manual	Rejected multicast %s for port GUID %016Lx.
	SRV__CAPABILITY_MASK_MODIFIED_TRAP_144 Object: node Parameters: new capability mask value (uint32)	N	144	normal		manual	At LID XYZ, new CapMask 0x%08X
	SRV__SYSTEM_GUID_MODIFIED_TRAP_145 Object: node	N	145	normal		manual	At LID XYZ, new SysGUID %016Lx.
	OSM_EVENT_MULTICAST_LEAVE Object: node Parameters: gid, mgid, mlid	N		normal	disable	Join(below)	Port GID %016Lx%016Lx left MGID %016Lx%016Lx (MLID 0x%X).
	OSM_EVENT_MULTICAST_JOIN	N		normal			Port GID %016Lx%016Lx

Alarm No.	Alarm/Trap Name	Map Trap to Alarm?	IB Trap	Severity	Default	Corrective	Log format
	N Object: node Parameters: gid, mgid, mlid						joined MGID %016Lx%016Lx (MLID 0x%X).
	SRV__LID_CHANGE_EVENT Object: node Parameters: min lid, max lid, old min lid, old max lid	Y		normal	enable	manual	Assigned new LID [XYZ-XYZ] for port GUID %016Lx, old LID [XYZ-XYZ].
	SRV__SM_LID_CHANGE_EVENT Object: SM Parameters: SM port guid, min lid, sm base lid	Y		normal	enable	manual	Assigned new LID XYZ to SM GUID %016Lx after reconfigure, old LID XYZ.
	OSM_EVENT_RESET_PORT_COUNTERS Object: SM			normal			Reset all Port Counters.
	OSM_EVENT_RESET_PORT_COUNTERS_COMPLETED Object: SM			normal			Reset Port Counters Completed.
	OSM_EVENT_GET_PORT_COUNTERS Object: SM			normal			Get Subnet Port Counters.
	OSM_EVENT_GET_PORT_COUNTERS_COMPLETED Object: SM			normal			Get Subnet Port Counters Completed.
	OSM_EVENT_MCAST_CONFIG_REPORT Object: SM Parameters: mlid, number of ports (int32), max tree depth (int16)			normal			Configured MLID 0x%X for %u ports, max tree depth = %u.
	SRV__SM_STATE_CHANGE_EVENT						
	OSM_EVENT_SM_STATE_NOT_ACTIVE Object: SM	N		normal	enable	manual	Entering SM Not Active State.
	OSM_EVENT_SM_STATE_STANDBY Object: SM	N		normal	enable	manual	Entering SM Standby State.
	OSM_EVENT_SM_STATE_DISCOVER Object: SM	N		normal	enable	manual	Entering SM Discovering State.
	OSM_EVENT_SM_STATE_MASTER Object: SM	N		normal	enable	manual	Entering SM Master State.
	SRV__TOPOLOGY_ERROR_EVENT						
	OSM_EVENT_ILLEGAL_CONNECTION Object: port	N		minor	enable	manual	Illegal connections between two sLB ports: port GUID %016Lx port#XYZ is connected to port GUID %016Lx port#XYZ.
	OSM_EVENT_ILLEGAL_CONNECTION Object: port Parameters: src distance (int32), dst distance (int32)	N		minor	enable	manual	Found illegal connection between port GUID %016Lx port#XYZ, distance XYZ and port GUID %016Lx port#XYZ, distance XYZ.
	OSM_EVENT_SWITCH_UNEXPECTED_DISTANCE Object: node Parameters: distance, expected distance	N		minor	enable	manual	Unexpected distance XYZ hops from Switch GUID %016Lx to sFB, expected (XYZ) hops.

Alarm No.	Alarm/Trap Name	Map Trap to Alarm?	IB Trap	Severity	Default	Corrective	Log format
	OSM_EVENT_TOPOLOGY_LINEAR_FDB_CAP_TO_SMALL Object: SM Parameters: switch guid, fdb cap, lmc	N		minor			Unable to configure all LIDs on Switch GUID %016Lx - LinearFDBCap (XYZ) is too small for current subnet LMC XYZ.
	OSM_EVENT_UPDOWN_ROUTING_FAILURE Object: SM						Up-down routing failure. No up-ports found. Possibly invalid sFB configuration – switching to default method.
	SRV_TOPOLOGY_WARNING_EVENT						
	OSM_EVENT_CA_UNEXPECTED_DISTANCE Object: node Parameters: distance	N		warning	Enable	manual	Found CA port GUID %016Lx at unexpected distance XYZ hops from sFB.
	OSM_EVENT_INVALID_NUM_SFBS Object: SM Parameters: number of sFBs (int32), predefined number of sFBs (int32)	N		minor	Enable	manual	Number of sFBs found (XYZ) does not match predefined number of sFBs (XYZ).
	OSM_EVENT_MINIMAL_LMC_VALUE_REQUIRED Object: SM Parameters: minimal lmc required, current lmc	N		warning	enable	manual	Minimal LMC value of XYZ is required for persistent CLOS routing, current LMC is XYZ.
	OSM_EVENT_UNABLE_APPLY_ROUTING Object: SM Parameters: routing scheme (char*)	N		minor	enable	manual	Unable to apply %s routing scheme - switching to default method.
	SRV_TOPOLOGY_INFO_EVENT						
	OSM_EVENT_SWITCH_OUT_OF_CLOS Object: node	N		warning	enable	manual	Found a Switch GUID %016Lx outside the CLOS.
	OSM_EVENT_HCA_OUT_OF_CLOS Object: node	N		warning	enable	manual	Found an HCA/Router GUID %016Lx outside the CLOS.
	OSM_EVENT_CREATE_MC_GROUP Object: SM			normal			Create Multicast group. MGID %016Lx%016Lx.
	OSM_EVENT_DELETE_MC_GROUP Object: SM			normal			Delete Multicast group. MGID %016Lx%016Lx.
	OSM_EVENT_COMPLETE_SUBNET_RECONF Object: SM			normal			Complete subnet reconfiguration.
	OSM_EVENT_APPLIED_ROUTING Object: SM Parameters: routing scheme (char*)			normal			Applied %s routing scheme
	OSM_EVENT_PORT_STATE_CHANGE Object: node			normal			Port State Change. Reporting Switch LID XYZ.

Table C-5. Alarm Table – Detailed Specification



Appendix D Glossary

API	Application Programming Interface
ARP	Address Resolution Protocol
CBB	Constant bisectional bandwidth
CD	Compact Disk
CLI	Command Line Interface
CPU	Central Processing Unit
CQ	Completion Queues
DMA	Direct Memory Access
FC	Fibre Channel
FE	Fast Ethernet
FTP	File Transfer Protocol
FRU	Field Replaceable Unit
GbE	Gigabit Ethernet
GE	Gigabit Ethernet
GUI	Graphical User Interface
GUID	Global Unique ID
GW	Gateway
HCA	Host Control Adaptor
HPC	High-performance computing
HQ	Head of Queue
IB	InfiniBand
I/O	Input Output
IP	Internet Protocol
ISR	InfiniBand Switch Router

IT	Information Technology
LID	Local ID
LIDSTAT	Properties retrieved from a specific LID
LAN	Local Area Network
LMC	LID Mask Control
MIB	Management Information Base
MTU	Maximum Transmission Level
NAS	Network Attached Storage
OS	Operating System
PM	Performance Management
QoS	Quality of Service
QP	Queue pairs
RC	Reliable Connection
RDMA	Remote Direct Memory Access
SAN	Storage Area Network
SA	Subnet Administration
SDP	Socket Direct Protocol
SMP	Short for Simple Management Protocol, another name for SNMP2. SNMP2 is an enhanced version of the Simple Network Management Protocol (SNMP) with features required to support larger networks operating at high data transmission rates. SNMP2 also supports multiple network management workstations organized in a hierarchical fashion.
sFB12	Fabric Board with 12-port support
sLB24	Line Board with 24 ports
sFU-x	Fan Unit
SL	Service Level
SM	Subnet Manager
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
UDP	Unreliable Datagram Protocol
VDM	Voltaire Device Manager
VFM	Voltaire Fabric Manager

VL	Virtual Lane
WQE	Work Queue Elements



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